

PCT

REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only	
International Application No.	PCT 13.06.96 受領印
International Filing Date	
Name of receiving Office and "PCT International Application"	
Applicant's or agent's file reference (if desired) (12 characters maximum) P-24413	

Box No. I TITLE OF INVENTION

SEMICONDUCTOR DEVICE, IC CARD UTILIZING THE SAME AND COMMUNICATION SYSTEM

Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

ROHM CO., LTD.
21, Saiin Mizosaki-cho, Ukyo-ku, Kyoto-shi,
KYOTO 615 JAPAN

☐ This person is also inventor.

Telephone No.

Facsimile No.

Teleprinter No.

State (i.e. country) of nationality:

JAPAN

State (i.e. country) of residence:

JAPAN

This person is applicant for the purposes of:

☐ all designated States

☒ all designated States except the United States of America

☐ the United States of America only

☐ the States indicated in the Supplemental Box

Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

KAMEI Shinji
c/o ROHM CO., LTD., 21, Saiin Mizosaki-cho, Ukyo-ku,
Kyoto-shi, KYOTO 615 JAPAN

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box is marked, do not fill in below.)

State (i.e. country) of nationality:

JAPAN

State (i.e. country) of residence:

JAPAN

This person is applicant for the purposes of:

☐ all designated States

☐ all designated States except the United States of America

☒ the United States of America only

☐ the States indicated in the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

(7387)HAGINO Taira
Eikoh Patent Office,
28th Floor, ARK Mori Building,
12-32, Akasaka 1-chome, Minato-ku,
TOKYO 107 JAPAN

Telephone No.

03-5561-3990

Facsimile No.

03-5561-3995

Teleprinter No.

☐ Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

Box No.V DESIGNATION OF STATES

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

Regional Patent

- ☐ AP ARIPO Patent: KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☐ EA Eurasian Patent: AZ Azerbaijan, BY Belarus, KZ Kazakhstan, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ EP European Patent: ~~AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, DE Germany, DK Denmark, ES Spain, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT~~
- ☐ OA OAPI Patent: BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

National Patent (if other kind of protection or treatment desired, specify on dotted line):

- | | |
|---|---|
| <input type="checkbox"/> AL Albania | <input type="checkbox"/> MD Republic of Moldova |
| <input type="checkbox"/> AM Armenia | <input type="checkbox"/> MG Madagascar |
| <input type="checkbox"/> AT Austria | <input type="checkbox"/> MK The former Yugoslav Republic of Macedonia |
| <input type="checkbox"/> AU Australia | |
| <input type="checkbox"/> AZ Azerbaijan | <input type="checkbox"/> MN Mongolia |
| <input type="checkbox"/> BB Barbados | <input type="checkbox"/> MW Malawi |
| <input type="checkbox"/> BG Bulgaria | <input type="checkbox"/> MX Mexico |
| <input type="checkbox"/> BR Brazil | <input type="checkbox"/> NO Norway |
| <input type="checkbox"/> BY Belarus | <input type="checkbox"/> NZ New Zealand |
| <input checked="" type="checkbox"/> CA Canada | <input type="checkbox"/> PL Poland |
| <input type="checkbox"/> CH and LI Switzerland and Liechtenstein | <input type="checkbox"/> PT Portugal |
| <input checked="" type="checkbox"/> CN China | <input type="checkbox"/> RO Romania |
| <input type="checkbox"/> CZ Czech Republic | <input type="checkbox"/> RU Russian Federation |
| <input type="checkbox"/> DE Germany | <input type="checkbox"/> SD Sudan |
| <input type="checkbox"/> DK Denmark | <input type="checkbox"/> SE Sweden |
| <input type="checkbox"/> EE Estonia | <input type="checkbox"/> SG Singapore |
| <input type="checkbox"/> ES Spain | <input type="checkbox"/> SI Slovenia |
| <input type="checkbox"/> FI Finland | <input type="checkbox"/> SK Slovakia |
| <input type="checkbox"/> GB United Kingdom | <input type="checkbox"/> TJ Tajikistan |
| <input type="checkbox"/> GE Georgia | <input type="checkbox"/> TM Turkmenistan |
| <input type="checkbox"/> HU Hungary | <input type="checkbox"/> TR Turkey |
| <input type="checkbox"/> IS Iceland | <input type="checkbox"/> TT Trinidad and Tobago |
| <input type="checkbox"/> JP Japan | <input type="checkbox"/> UA Ukraine |
| <input type="checkbox"/> KE Kenya | <input type="checkbox"/> UG Uganda |
| <input type="checkbox"/> KG Kyrgyzstan | <input checked="" type="checkbox"/> US United States of America |
| <input type="checkbox"/> KP Democratic People's Republic of Korea | |
| <input type="checkbox"/> KR Republic of Korea | <input type="checkbox"/> UZ Uzbekistan |
| <input type="checkbox"/> KZ Kazakhstan | <input type="checkbox"/> VN Viet Nam |
| <input type="checkbox"/> LK Sri Lanka | |
| <input type="checkbox"/> LR Liberia | |
| <input type="checkbox"/> LS Lesotho | |
| <input type="checkbox"/> LT Lithuania | |
| <input type="checkbox"/> LU Luxembourg | |
| <input type="checkbox"/> LV Latvia | |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐
- ☐
- ☐
- ☐

In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of _____

The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

Supplemental Box

If the Supplemental Box is not used, this sheet need not be included in the request.

Use this box in the following cases:

1. *If, in any of the Boxes, the space is insufficient to furnish all the information:*

in such case, write "Continuation of Box No." [indicate the number of the Box] and furnish the information in the same manner as required according to the captions of the Box in which the space was insufficient;

in particular:

 - (i) *if more than two persons are involved as applicants and/or inventors and no "continuation sheet" is available:*

in such case, write "Continuation of Box No. III" and indicate for each additional person the same type of information as required in Box No. III;
 - (ii) *if, in Box No. II or in any of the sub-boxes of Box No. III, the indication "the States indicated in the Supplemental Box" is checked:*

in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the applicant(s) involved and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is applicant;
 - (iii) *if, in Box No. II or in any of the sub-boxes of Box No. III, the inventor or the inventor/applicant is not inventor for the purposes of all designated States or for the purposes of the United States of America:*

in such case, write "Continuation of Box No. II" or "Continuation of Box No. III" or "Continuation of Boxes No. II and No. III" (as the case may be), indicate the name of the inventor(s) and, next to (each) such name, the State(s) (and/or, where applicable, ARIPO, Eurasian, European or OAPI patent) for the purposes of which the named person is inventor;
 - (iv) *if, in addition to the agent(s) indicated in Box No. IV, there are further agents:*

in such case, write "Continuation of Box No. IV" and indicate for each further agent the same type of information as required in Box No. IV;
 - (v) *if, in Box No. V, the name of any State (or OAPI) is accompanied by the indication "patent of addition," or "certificate of addition," or if, in Box No. V, the name of the United States of America is accompanied by an indication "Continuation" or "Continuation-in-part":*

in such case, write "Continuation of Box No. V" and the name of each State involved (or OAPI), and after the name of each such State (or OAPI), the number of the parent title or parent application and the date of grant of the parent title or filing of the parent application;
 - (vi) *if there are more than three earlier applications whose priority is claimed:*

in such case, write "Continuation of Box No. VI" and indicate for each additional earlier application the same type of information as required in Box No. VI.
2. *If the applicant claims, in respect of any designated Office, the benefits of provisions of the national law concerning non-prejudicial disclosures or exceptions to lack of novelty:*

in such case, write "Statement Concerning Non-Prejudicial Disclosures or Exceptions to Lack of Novelty" and furnish that statement below.

Continuation of Box No. IV

(8107)SASAKI Kiyotaka
 (6642)FUKAZAWA Toshio
 (9357)SOEDA Zenichi
 Eikoh Patent Office,
 28th Floor, ARK Mori Building,
 12-32, Akasaka 1-chome, Minato-ku,
 TOKYO 107 JAPAN

Box No. VI PRIORITY CLAIMFurther priority claims are indicated in the Supplemental Box ☐

The priority of the following earlier application(s) is hereby claimed:

Country (in which, or for which, the application was filed)	Filing Date (day/month/year)	Application No.	Office of filing (only for regional or international application)
item (1) J A P A N	1 6 . 0 6 . 9 5	Patent Application 0 7 - 1 5 0 6 0 5	
item (2) J A P A N	2 4 . 0 1 . 9 6	Patent Application 0 8 - 0 1 0 4 6 3	
item (3)			

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

☐ The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s):
Box No. VII INTERNATIONAL SEARCHING AUTHORITY

Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): ISA / EP

Earlier search Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request.

Country (or regional Office):

Date (day/month/year):

Number:

Box No. VIII CHECK LIST

This international application contains the following number of sheets:

1. request : 4 sheets
 2. description : 19 sheets
 3. claims : 2 sheets
 4. abstract : 1 sheets
 5. drawings : 6 sheets

Total : 32 sheets

This international application is accompanied by the item(s) marked below:

1. ☐ separate signed power of attorney
 2. ☐ copy of general power of attorney
 3. ☐ statement explaining lack of signature
 4. ☐ priority document(s) identified in Box No. VI as item(s):
 5. ☒ fee calculation sheet
 6. ☐ separate indications concerning deposited microorganisms
 7. ☐ nucleotide and/or amino acid sequence listing (diskette)
 8. ☐ other (specify):

Figure No. 1 of the drawings (if any) should accompany the abstract when it is published.

Box No. IX SIGNATURE OF APPLICANT OR AGENT

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).

SASAKI Kiyotaka

FUKAZAWA Toshio

SOEDA Zenichi

For receiving Office use only

1. Date of actual receipt of the purported international application:	2. Drawings: <input type="checkbox"/> received: <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority specified by the applicant: ISA /	
6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid	

For International Bureau use only

Date of receipt of the record copy by the International Bureau:

PCT

FEE CALCULATION SHEET

Annex to the Request

For receiving Office use only

International application No.

Applicant's or agent's
file reference

P - 2 4 4 1 3

Date stamp of the receiving Office

Applicant

ROHM CO., LTD.

CALCULATION OF PRESCRIBED FEES

1. TRANSMITTAL FEE 18,000- ☐ T
2. SEARCH FEE 169,000- ☐ S

International search to be carried out by EPO
(If two or more International Searching Authorities are competent in relation to the international application, indicate the name of the Authority which is chosen to carry out the international search.)

3. INTERNATIONAL FEE

Basic Fee

The international application contains 32 sheets.

first 30 sheets 67,400- ☐ b₁

2 x 1,300 = 2,600- ☐ b₂

remaining sheets additional amount

Add amounts entered at b₁ and b₂ and enter total at B 70,000- ☐ B

Designation Fees

The international application contains 4 designations.

4 x 16,400 = 65,600- ☐ D

number of designation fees amount of designation fee payable (maximum 11)

Add amounts entered at B and D and enter total at I 135,600- ☐ I

(Applicants from certain States are entitled to a reduction of 75% of the international fee. Where the applicant is (or all applicants are) so entitled, the total to be entered at I is 25% of the sum of the amounts entered at B and D.)

4. FEE FOR PRIORITY DOCUMENT ☐ P

5. TOTAL FEES PAYABLE

Add amounts entered at T, S, I and P, and enter total in the TOTAL box 322,600-
TOTAL

☐ The designation fees are not paid at this time.

MODE OF PAYMENT

- ☐ authorization to charge deposit account (see below) ☒ bank draft ☐ coupons
- ☐ cheque ☐ cash ☐ other (specify):
- ☐ postal money order ☐ revenue stamps

DEPOSIT ACCOUNT AUTHORIZATION (this mode of payment may not be available at all receiving Offices)

- The RO/ ☐ is hereby authorized to charge the total fees indicated above to my deposit account.
- ☐ is hereby authorized to charge any deficiency or credit any overpayment in the total fees indicated above to my deposit account.
- ☐ is hereby authorized to charge the fee for preparation and transmittal of the priority document to the International Bureau of WIPO to my deposit account.

Deposit Account Number

Date (day/month/year)

Signature

特許協力条約

RECEIVED
JUN 26 1996
EIKOH PATENT OFFICE

発信人 日本国特許庁 (受理官庁)

出願人代理人

I HAGINO TAIRA

あて名

〒107

EIKOH PATENT OFFICE,
28TH FLOOR, ARK MORI
BUILDING, 12-32, AKASA
KA 1-CHOME, MINATO-KU
TOKYO

PCT/JP96/01622

RO105

P C T

国際出願番号及び 国際出願日の通知書

(法施行規則第22条、第23条)
(PCT規則20.5(c))

出願人又は代理人 の書類記号 P-24413		発送日 (日. 月. 年) 25. 06. 96	
国際出願番号 PCT/JP96/01622	国際出願日 (日. 月. 年) 13. 06. 96	重 要 な 通 知 優先日 (日. 月. 年) 16. 06. 95	
出願人 (氏名又は名称) ROHM CO., LTD.			

1. この国際出願は、上記の国際出願番号及び国際出願日が付与されたことを通知する。

記録原本は、25日06月96年 に国際事務局に送付した。

注 意

- 国際出願番号は、特許協力条約を表示する「PCT」の文字、斜線、受理官庁を表示する2文字コード (日本の場合JP)、西暦年の最後から2桁の数字、斜線、及び5桁の数字からなっています。
- 国際出願日は、「特許協力条約に基づく国際出願に関する法律」第4条第1項の要件を満たした国際出願に付与されます。
- あて名等を変更したときは、速やかにあて名の変更届等を提出して下さい。
- 電子計算機による漢字処理のため、漢字の一部を当用漢字、又は、仮名に置き換えて表現してある場合もありますので御了承下さい。
- この通知に記載された出願人のあて名、氏名 (名称) に誤りがあるときは申出により訂正します。
- 国際事務局は、受理官庁から記録原本を受領した場合には、出願人にその旨を速やかに通知 (様式PCT/IB/301) する。記録原本を優先日から14箇月が満了しても受領していないときは、国際事務局は出願人にその旨を通知する。〔PCT規則22.1(c)〕

名称及びあて名

日本国特許庁 (RO/JP)

郵便番号 100 TEL03-3592-1308

日本国東京都千代田区霞が関三丁目4番3号

様式PCT/RO/105 (1992年7月)

権限のある職員

特 許 庁 長 官

PATENT COOPERATION TREATY

RECEIVED
 JUN 26 1996
 EIKOH PATENT OFFICE

From the RECEIVING OFFICE

To: HAGINO TAIRA

〒107

EIKOH PATENT OFFICE,
 28TH FLOOR, ARK MORI
 BUILDING, 12-32, AKASA
 KA 1-CHOME, MINATO-KU
 TOKYO

PCT

7/25

INVITATION TO CORRECT DEFECTS IN THE INTERNATIONAL APPLICATION

(PCT Articles 3(4)(i) and 14(1) and Rule 26)

Applicant's or agent's file reference <p style="text-align: center;">P-24413</p>	Date of mailing <i>(day/month/year)</i> <p style="text-align: center; font-size: 1.2em;">25.06.96</p>
International application No. <p style="text-align: center;">PCT/JP96/01622</p>	REPLY DUE within 1 months, from the above date of mailing <hr/> International filing date <i>(day/month/year)</i> <p style="text-align: center;">13.06.96</p>
Applicant <p style="text-align: center;">ROHM CO., LTD.</p>	

The applicant is hereby invited, within the time limit indicated above, to correct the defects in the international application, which are specified on the attached



Annex A



Annex B



Annex C

Additional observations (if necessary):

HOW TO CORRECT THE DEFECTS?

Correction must be submitted by filing a replacement sheet embodying the correction and a letter accompanying the replacement sheet, which shall draw attention to the difference between the replaced sheet and the replacement sheet. A correction may be stated in a letter only if it is of such a nature that it can be transferred from the letter to the record copy without adversely affecting the clarity and direct reproducibility of the sheet onto which the correction is to be transferred (Rule 26.4(a)).

ATTENTION

Failure to correct the defects will result in the international application being considered withdrawn by this receiving Office (see Rule 26.5 for further details).

A copy of this invitation and any attachments has been sent to the International Bureau



and the International Searching Authority.

Name and mailing address of the receiving Office Facsimile No.	Authorized officer Telephone No.
---	---

PCT/JP96/01622

The receiving Office has found the following defects in the international application:

1. As to signature* of the international application (Rules 4.15 and 90.4), the request:

- a. ☐ is not signed.
- b. ☐ is not signed by all the applicants.
- c. ☐ is not accompanied by the statement referred to in the check list in Box No. VIII of the request explaining the lack of the signature of an applicant for the designation of the United States of America.
- d. ☒ is signed by what appears to be an agent/common representative but
 - ☒ the international application is not accompanied by a power of attorney appointing him.
 - ☐ the power of attorney accompanying the international application was not signed by all the applicants.
- e. ☐ other (specify):

* All applicants must sign, including inventors if they are also applicants (e.g. where the United States of America is designated).

2. As to indications concerning the applicant, the request (Rules 4.4 and 4.5):

- a. ☐ does not properly indicate the applicant's name (specify):
- b. ☐ does not indicate the applicant's address.
- c. ☐ does not properly indicate the applicant's address (specify):
- d. ☐ does not indicate the applicant's nationality.
- e. ☐ does not indicate the applicant's residence.
- f. ☐ other (specify):

3. As to the language of some parts of the international application (Rule 12.1):

- a. ☐ the request is not in (one of) the admitted language(s) which is (are):
- b. ☐ the text matter of the drawings is not in (one of) the admitted language(s) which is (are):
- c. ☐ the abstract is not in (one of) the admitted language(s) which is (are):

4. The title of the invention:

- a. ☐ is not indicated in Box No. I of the request (Rule 4.1(a)).
- b. ☐ is not indicated at the top of the first sheet of the description (Rule 5.1(a)).
- c. ☐ as appearing in Box No. I of the request is not identical with the title heading the description (Rule 5.1(a)).

5. As to the abstract (Rule 8):

- ☐ the international application does not contain an abstract.

PATENT COOPERATION TREATY

RECEIVED
JUL 18 1996
EIKOH PATENT OFFICE

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF RECEIPT
OF SEARCH COPY

(Pct Rule 25.1)

To:

Eikoh Patent Office
Attn. HAGINO, Taira
28th Floor, ARK Mori Building
12-32, Akasaka 1-Chome, Minato-Ku
TOKYO 107
JAPAN

Date of mailing
(day/month/year)

15/07/96

Applicant's or agent's file reference

P-24413

IMPORTANT NOTIFICATION

International application No.

PCT/JP 96/01622

International filing date (day/month/year)

13/06/96

(Priority date)

(day/month/year)

16/06/95

Applicant

ROHM CO., LTD. et al.

1. Where the International Searching Authority and the receiving Office are not the same Office:

The applicant is hereby notified that the search copy of the international application was received by this International Searching Authority on the date indicated below.

Where the International Searching Authority and the receiving Office are the same Office:

The applicant is hereby notified that the search copy of the international application was received on the date indicated below.

27/06/96

(date of receipt).

2. Time limit for establishment of international search report

The applicant is informed that the time limit for establishing the international search report is 3 months from the date of receipt indicated above or 9 months from the priority date, whichever time limit expires later

3. A copy of this notification has been sent to the International Bureau and, where the first sentence of paragraph 1 applies, to the receiving Office.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

ISA/EP

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

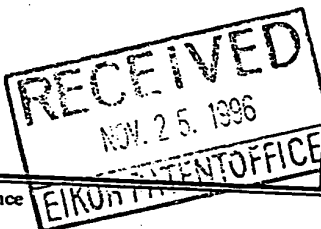
PCT

1/5

INVITATION TO PAY ADDITIONAL FEES

(PCT Article 17(3)(a) and Rule 40.1)

To:
Eikoh Patent Office
Attn. HAGINO, Taira
28th Floor, ARK Mori Building
12-32, Akasaka 1-Chome, Minato-Ku
TOKYO 107
JAPAN



Applicant's or agent's file reference
P-24413

Date of mailing
(day/month/year) 21.11.96

International application No.
PCT/JP 96/01622

PAYMENT DUE
within 45 ~~XXXXX~~ days
from the above date of mailing

International filing date
(day/month/year) 13/06/1996

Applicant

ROHM CO., LTD. et al.

1. This International Searching Authority

(i) considers that there are 2 (number of) inventions claimed in the international application covered by the claims indicated ~~below~~ on the extra sheet:

and it considers that the international application does not comply with the requirements of unity of invention (Rules 13.1, 13.2 and 13.3) for the reasons indicated ~~below~~ on the extra sheet:

(ii) ☒ has carried out a partial international search (see Annex) ☐ will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:
1

(iii) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid

2. The applicant is hereby invited, within the time limit indicated above, to pay the amount indicated below:

DEM 2400,= x 1 = DEM 2400,=
Fee per additional invention number of additional inventions total amount of additional fees

The applicant is informed that, according to Rule 40.2(c), the payment of any additional fee may be made under protest, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive.

3. ☐ Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority
 European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

VAN DEURSEN T M M

The search examiner distinguishes the following subjects and groups of claims defining them:

1. Claim 1: Semiconductor device comprising a ring oscillator and a constant current circuit.

2. Claims 2-7: an IC card device comprising a first antenna and a second antenna

The prior art document D1=DE,A,43 37 499 is taken into account for the following reasoning and discloses a semiconductor device comprising a ring oscillator and a constant current circuit solving the problem to form an oscillator having an oscillation frequency which is relatively precise as explained in the description.

The first group consisting of claim 1 (first invention) yields no special technical feature, because all the features of claim 1 are known from document D1 (see abstract; claims 1, 5, 6; figures 1-8).

The second group of claims, 2-7 (second invention) yields the following potential special technical features: an IC card, comprising a first antenna and a second antenna or a communication system comprising an IC card incorporating therewithin a semiconductor integrated circuit and at least an antenna to obtain electric power, solving the problem to avoid the necessity of frequent repetition of charging electricity each time the stored electric power becomes insufficient.

No special technical features are available by means of which a relationship could be established between the subject-matters of claim 1 on the one hand and claims 2-7 on the other hand.

Consequently, neither the objective problems underlying the subjects of the 2 claimed inventions, nor their solutions as defined by the special technical features described allow for the link of a common inventive concept to be established between the said inventions. In conclusion, therefore, the 2 groups of claims are not linked by common or corresponding special technical features and define 2 different inventions not linked by a single general inventive concept.

The application hence does not meet the requirements of unity of invention as defined in rule 13(1) and (2) PCT.

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.
3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.
4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 43 37 499 A (MITSUBISHI ELECTRIC CORP) 1 June 1994 see abstract; claims 1,5,6; figures 1-8 -----	1

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents :

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

& document member of the same patent family

Patent Family Annex
Information on patent family members

International Application No
PCT/JP 96/01622

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-4337499	01-06-94	JP-A- 6152334	31-05-94
		US-A- 5446418	29-08-95

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference P-24413	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">FOR FURTHER ACTION</div> <div style="font-size: small;">see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</div> </div>	
International application No. PCT/JP 96/ 01622	International filing date(<i>day/month/year</i>) 13/06/1996	(Earliest) Priority Date (<i>day/month/year</i>) 16/06/1995
Applicant ROHM CO., LTD. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☒ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a nucleotide and/or amino acid sequence listing and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.
☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☒ the text is approved as submitted by the applicant.
☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☐ the text is approved as submitted by the applicant.
☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the drawings to be published with the abstract is:
 Figure No. 2

☐ as suggested by the applicant. ☐ None of the figures.
☒ because the applicant failed to suggest a figure.
☐ because this figure better characterizes the invention.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP 96/01622

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. Claim 1: Semiconductor device comprising a ring oscillator and a constant current circuit.
 2. Claims 2-7: an IC card device comprising a first antenna and a second antenna.
1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
 2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
 3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
 4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

It is an object to provide an IC card which is facilitated in circuit configuration and program-development as well as a communication system which is improved in characteristics such as the rate of communication and the distance of communication. An IC card (10) comprises an antenna (22a) for receiving an electromagnetic wave for supplying electric power, an antenna (22b) for receiving an electromagnetic wave for data, a rectifying circuit 11 with a capacitor (6) to rectify the received electromagnetic wave to get electric power, a power source circuit (12) for supplying a power source voltage to an internal circuit of the IC card (10) by the use of the electric power obtained, a detecting circuit (13) for detecting a component of data from the received electromagnetic wave, a modulating/demodulating circuit (14) for demodulating the received data and modulating data to be transmitted, a ring oscillation circuit (1) for generating a clock signal CP to be supplied into internal circuits and a semiconductor device such as a micro-computer and memories not shown for processing and storing the data obtained.

INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 96/01622A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 G06K19/07 H03K3/03

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 G06K H03K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 43 37 499 A (MITSUBISHI ELECTRIC CORP) 1 June 1994	1
Y	see abstract; claims 1,5,6; figures 1-8 ---	3
X	EP 0 309 201 A (HITACHI MAXELL) 29 March 1989	2,4-7
Y	see column 3, line 33 - column 5, line 11; figures 1,4,5 ---	3
A	EP 0 634 837 A (MITSUBISHI ELECTRIC CORP) 18 January 1995 see column 1, line 5 - line 15 see column 3, line 48 - column 4, line 38; figures 1,6 -----	1,3

☐ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

20 January 1997

Date of mailing of the international search report

07.03.97

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Gysen, L

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/JP 96/01622

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE-A-4337499	01-06-94	JP-A- 6152334	31-05-94
		US-A- 5446418	29-08-95
EP-A-0309201	29-03-89	JP-A- 1081086	27-03-89
		JP-A- 1102693	20-04-89
		JP-A- 1124084	16-05-89
		US-A- 5113184	12-05-92
EP-A-0634837	18-01-95	JP-A- 7030378	31-01-95
		US-A- 5424690	13-06-95

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

5/7

To:

Eikoh Patent Office
Attn. HAGINO, Taira
28th Floor, ARK Mori Building
12-32, Akasaka 1-Chome, Minato-Ku
TOKYO 107
JAPAN

Date of mailing
(day/month/year)

07/03/1997

Applicant's or agent's file reference

P-24413

FOR FURTHER ACTION See paragraphs 1 and 4 below

International application No.

PCT/JP 96/ 01622

International filing date
(day/month/year)

13/06/1996

Applicant

ROHM CO., LTD. et al.

1. ☒ The applicant is hereby notified that the International Search Report has been established and is transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report; however, for more details, see the notes on the accompanying sheet.

Where? Directly to the International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland
Facsimile No.: (41-22) 740.14.35

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no International Search Report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.

3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicants's request to forward the texts of both the protest and the decision thereon to the designated Offices.

☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Further action(s):** The applicant is reminded of the following:

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later).

Within 20 months from the priority date, the applicant must perform the prescribed acts for entry into the national phase before all designated Offices which have not been elected in the demand or in a later election within 19 months from the priority date or could not be elected because they are not bound by Chapter II.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Trudy Thoen-de Jong

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the PCT Applicant's Guide, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only.

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Administrative Instructions, Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

NOTES TO FORM PCT/ISA/220 (continued)

The letter must indicate the differences between the claims as filed and the claims as amended. It must, in particular, indicate, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed.

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 51]:
"Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]:
"Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]:
"Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or
"Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]:
"Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

"Statement under article 19(1)" (Rule 46.4)

The amendments may be accompanied by a statement explaining the amendments and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement will be published with the international application and the amended claims.

It must be in the language in which the international application is to be published.

It must be brief, not exceeding 500 words if in English or if translated into English.

It should not be confused with and does not replace the letter indicating the differences between the claims as filed and as amended. It must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

It may not contain any disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim.

Consequence if a demand for international preliminary examination has already been filed

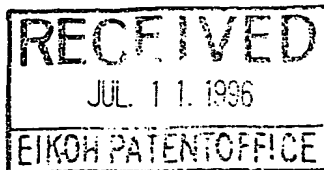
If, at the time of filing any amendments under Article 19, a demand for international preliminary examination has already been submitted, the applicant must preferably, at the same time of filing the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority (see Rule 62.2(a), first sentence).

Consequence with regard to translation of the international application for entry into the national phase

The applicant's attention is drawn to the fact that, where upon entry into the national phase, a translation of the claims as amended under Article 19 may have to be furnished to the designated/elected Offices, instead of, or in addition to, the translation of the claims as filed.

For further details on the requirements of each designated/elected Office, see Volume II of the PCT Applicant's Guide.

PATENT COOPERATION TREATY



PCT

From the INTERNATIONAL BUREAU

To:

HAGINO, Taira
Eikoh Patent Office
28th Floor, ARK Mori Building
12-32, Akasaka 1-chome
Minato-ku
Tokyo 107
JAPON

NOTIFICATION OF RECEIPT OF
RECORD COPY

(PCT Rule 24.2(a))

Date of mailing (day/month/year) 01 July 1996 (01.07.96)	IMPORTANT NOTIFICATION
Applicant's or agent's file reference P-24413	International application No. PCT/JP96/01622

The applicant is hereby notified that the International Bureau has received the record copy of the international application as detailed below.

Name(s) of the applicant(s) and State(s) for which they are applicants:

ROHM CO., LTD. (for all designated States except US)
KAMEI, Shinji (for US)

International filing date : 13 June 1996 (13.06.96)
Priority date(s) claimed : 16 June 1995 (16.06.95)
24 January 1996 (24.01.96)
Date of receipt of the record copy
by the International Bureau : 01 July 1996 (01.07.96)

List of designated Offices :

EP : DE,FR,GB,IT,NL
National : CA,CN,US

ATTENTION

The applicant should carefully check the data appearing in this Notification. In case of any discrepancy between these data and the indications in the international application, the applicant should immediately inform the International Bureau.

In addition, the applicant's attention is drawn to the information contained in the Annex, relating to:

- ☒ time limits for entry into the national phase;
☒ confirmation of precautionary designations;
☒ requirements regarding priority documents.

A copy of this Notification is being sent to the receiving Office and to the International Searching Authority.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:

N. Kijima

Telephone No. (41-22) 730.91.11

INFORMATION ON TIME LIMITS FOR ENTERING THE NATIONAL PHASE

The applicant is reminded that the "national phase" must be entered before each of the designated Offices indicated in the Notification of Receipt of Record Copy (Form PCT/IB/301) by paying national fees and furnishing translations, as prescribed by the applicable national laws.

The time limit for performing these procedural acts is **20 MONTHS** from the priority date or, for those designated States which the applicant elects in a demand for international preliminary examination or in a later election, **30 MONTHS** from the priority date, provided that the election is made before the expiry of 19 months from the priority date. Some designated (or elected) Offices have fixed time limits which expire even later than 20 or 30 months from the priority date. In other Offices an extension of time or grace period, in some cases upon payment of an additional fee, is available.

In addition to these procedural acts, the applicant may also have to comply with other special requirements applicable in certain Offices. It is the applicant's responsibility to ensure that the necessary steps to enter the national phase are taken in a timely fashion. Most designated Offices do not issue reminders to applicants in connection with the entry into the national phase.

For detailed information about the procedural acts to be performed to enter the national phase before each designated Office, the applicable time limits and possible extensions of time or grace periods, and any other requirements, see the relevant Chapters of Volume II of the PCT Applicant's Guide. Information about the requirements for filing a demand for international preliminary examination is set out in Chapter IX of Volume I of the PCT Applicant's Guide.

Note that since ES and GR are not bound by PCT Chapter II (which provides for the international preliminary examination procedure), those States cannot be elected in a demand for international preliminary examination. In the case of the designation of ES for a national patent, the applicant must thus always enter the national phase before the national Office of that State before the expiry of 20 months from the priority date. In the case of the designation of ES or GR for a European patent, however, the 31-month time limit applies in respect of those designations if at least one other State designated for a European patent is also elected within the 19-month period.*

Note also that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

* CH and LI became bound by PCT Chapter II on 1 September 1995. Therefore, CH and LI may be elected in a demand or a later election filed on or after that date, regardless of the filing date of the international application. (See 2nd paragraph above.)

CONFIRMATION OF PRECAUTIONARY DESIGNATIONS

This notification lists only specific designations made under Rule 4.9(a) in the request. It is important to check that these designations are correct. Errors in designations can be corrected where precautionary designations have been made under Rule 4.9(b). The applicant is hereby reminded that any precautionary designations may be confirmed according to Rule 4.9(c) before the expiration of 15 months from the priority date. If it is not confirmed, it will automatically be regarded as withdrawn by the applicant. There will be no reminder and no invitation. Confirmation of a designation consists of the filing of a notice specifying the designated State concerned (with an indication of the kind of protection or treatment desired) and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.

REQUIREMENTS REGARDING PRIORITY DOCUMENTS

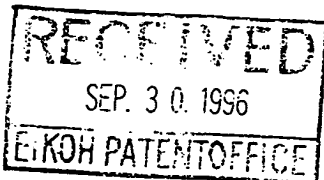
For applicants who have not yet complied with the requirements regarding priority documents the following is recalled.

Where the priority of an earlier national (i.e., national or regional) application is claimed, the applicant must submit a copy of the said national application, certified by the authority with which it was filed ("the priority document") to the receiving Office (which will transmit it to the International Bureau) or directly to the International Bureau, before the expiration of 16 months from the priority date (Rule 17.1).

Where the priority document is issued by the receiving Office, the applicant may, instead of submitting the priority document, request the receiving Office to prepare and transmit the priority document to the International Bureau. Such a request must be made before the expiration of the 16-month time limit.

It is recalled that, where several priorities are claimed, the priority date to be considered for the purposes of computing the 16-month time limit is the filing date of the earliest application whose priority is claimed.

If the priority document concerned is not submitted to the International Bureau before the expiration of the 16-month time limit, or if the request to the receiving Office to transmit the priority document has not been made (and the corresponding fee, if any, paid) before the expiration of this time limit, any designated State may disregard the priority claim.



PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

To:

HAGINO, Taira
Eikoh Patent Office
28th Floor, ARK Mori Building
12-32, Akasaka 1-chome
Minato-ku
Tokyo 107
JAPON

NOTIFICATION CONCERNING
SUBMISSION OF PRIORITY DOCUMENTS

(PCT Administrative Instructions, Section 411)

Date of mailing (day/month/year) 24 September 1996 (24.09.96)		IMPORTANT NOTIFICATION	
Applicant's or agent's file reference P-24413			
International application No. PCT/JP96/01622	International filing date (day/month/year) 13 June 1996 (13.06.96)	Priority date (day/month/year) 16 June 1995 (16.06.95)	
Applicant ROHM CO., LTD. et al			

The applicant is hereby notified of the date of receipt by the International Bureau of the priority document(s) relating to the following application(s):

<u>Priority application No:</u>	<u>Priority date:</u>	<u>Priority country:</u>	<u>Date of receipt of priority document:</u>
7/150605	16 Jun 1995 (16.06.95)	JP	20 Sep 1996 (20.09.96)
8/10463	24 Jan 1996 (24.01.96)	JP	20 Sep 1996 (20.09.96)

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Authorized officer

T. Inoue

Facsimile No.: (41-22) 740.14.35

Telephone No.: (41-22) 730.91.11

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF WITHDRAWAL OF
INTERNATIONAL APPLICATION OR
DESIGNATIONS(PCT Rule 90bis.1 and 90bis.2 and
Administrative Instructions, Section 415(a))

From the INTERNATIONAL BUREAU

To:

YANO, Juichiro
Nagahoriyachiyo Building
11-9, Minamisemba 1-chome
Chuo-ku
Osaka-shi
Osaka 542
JAPON

Date of mailing (day/month/year) 04 July 1997 (04.07.1997)		
Applicant's or agent's file reference PCT-005		IMPORTANT NOTIFICATION
International application No. PCT/JP96/02486	International filing date (day/month/year) 02 September 1996 (02.09.1996)	Priority date (day/month/year) 23 January 1996 (23.01.1996)
Applicant YANMAR AGRICULTURAL EQUIPMENT CO., LTD.		

1. The applicant is hereby notified that, except as to any designated State in which national processing or examination has already started upon the express request of the applicant:

- ☐ the international application
- ☒ the designations of the following States:
- ☐ for an ARIPO patent (specify "all States" or, if the withdrawal concerns only some States, specify those States only by indicating the two-letter country codes):
- ☐ for a Eurasian patent
- ☐ for a European patent (specify "all States" or, if the withdrawal concerns only some States, specify those States only by indicating the two-letter country codes):
- ☐ for an OAPI patent
- ☒ for a national patent (specify the States by indicating the two-letter country codes): AU, NZ, US

has (have) been withdrawn on the date of receipt of the notice effecting withdrawal as indicated below:

12 June 1997 (12.06.1997).

2. The notice effecting withdrawal reached the International Bureau

- ☒ before the completion of the technical preparations for publication and, consequently, there will be no international publication:
- ☐ of the international application.
- ☒ of the designations specified above.
- ☐ after the completion of the technical preparations for publication and, consequently, the withdrawal could not be taken into account for the international publication.

3. The receiving Office and, if they are affected by the withdrawal, the designated (or elected) Offices, the International Searching Authority and the International Preliminary Examining Authority, have been informed accordingly.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer K. Takeda
Facsimile No. (41-22) 740.14.35	Telephone No. (41-22) 338.83.38

PCT

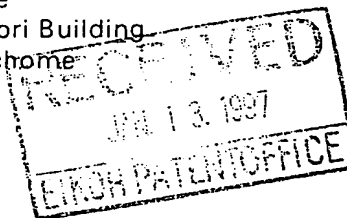
**NOTICE INFORMING THE APPLICANT OF THE
COMMUNICATION OF THE INTERNATIONAL
APPLICATION TO THE DESIGNATED OFFICES**

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

HAGINO, Taira
Eikoh Patent Office
28th floor, ARK Mori Building
12-32, Akasaka 1-chome
Minato-ku
Tokyo 107
JAPON



Date of mailing (day/month/year) 03 January 1997 (03.01.97)		
Applicant's or agent's file reference P-24413		IMPORTANT NOTICE
International application No. PCT/JP96/01622	International filing date (day/month/year) 13 June 1996 (13.06.96)	Priority date (day/month/year) 16 June 1995 (16.06.95)
Applicant ROHM CO., LTD. et al		

1. Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:
CA,CN,EP,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

2. The following designated Offices have waived the requirement for such a communication at this time:
None

The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).

3. Enclosed with this Notice is a copy of the international application as published by the International Bureau on 03 January 1997 (03.01.97) under No. WO 97/00493

REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

<p style="text-align: center;">The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland</p> <p>Facsimile No. (41-22) 740.14.35</p>	<p>Authorized officer J. Zahra</p> <p>Telephone No. (41-22) 730.91.11</p>
---	--

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 19 February 1997 (19.02.97)	
International application No. PCT/JP96/01622	Applicant's or agent's file reference P-24413
International filing date (day/month/year) 13 June 1996 (13.06.96)	Priority date (day/month/year) 16 June 1995 (16.06.95)
Applicant KAMEI, Shinji	

1 The designated Office is hereby notified of its election made:



In the demand filed with the International Preliminary Examining Authority on:

08 January 1997 (08.01.97)



in a notice effecting later election filed with the International Bureau on:

2 The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

K. Takeda

Telephone No.: (41-22) 730.91.11

PATENT COOPERATION TREATY

PCT

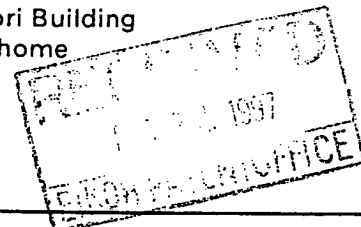
INFORMATION CONCERNING ELECTED
OFFICES NOTIFIED OF THEIR ELECTION

(PCT-Rule 61.3)

From the INTERNATIONAL BUREAU

To:

HAGINO, Taira
Eikoh Patent Office
28th floor, ARK Mori Building
12-32, Akasaka 1-chome
Minato-ku
Tokyo 107
JAPON



Date of mailing (day/month/year)
19 February 1997 (19.02.97)

Applicant's or agent's file reference
P-24413

IMPORTANT INFORMATION

International application No.
PCT/JP96/01622

International filing date (day/month/year)
13 June 1996 (13.06.96)

Priority date (day/month/year)
16 June 1995 (16.06.95)

Applicant
ROHM CO., LTD. et al

1. The applicant is hereby informed that the International Bureau has, according to Article 31(7), notified each of the following Offices of its election:

EP : DE, FR, GB, IT, NL
National : CA, CN, US

2. The following Offices have waived the requirement for the notification of their election; the notification will be sent to them by the International Bureau only upon their request:

None

3. The applicant is reminded that he must enter the "national phase" before the expiration of 30 months from the priority date before each of the Offices listed above. This must be done by paying the national fee(s) and furnishing, if prescribed, a translation of the international application (Article 39(1)(a)), as well as, where applicable, by furnishing a translation of the annexes of the international preliminary examination report (Article 36(3)(b) and Rule 74.1).

Some offices have fixed time limits expiring later than the above-mentioned time limit. For detailed information about the applicable time limits and the acts to be performed upon entry into the national phase before a particular Office, see Volume II of the PCT Applicant's Guide.

The entry into the European regional phase is postponed until 31 months from the priority date for all States designated for the purposes of obtaining a European patent including, where applicable, ES which cannot be elected since it is not bound by Chapter II.

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No. (41-22) 740.14.35

Authorized officer:

K. Takeda

Telephone No. (41-22) 730.91.11

PATENT COOPERATION TREATY

PCT

COMMUNICATION OF
INTERNATIONAL APPLICATIONS

(PCT Article 20)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ETATS-UNIS D'AMERIQUE

in its capacity as designated Office

Date of mailing:

12 June 1997 (12.06.97)

The International Bureau transmits herewith copies of the international applications having the following international application numbers and international publication numbers:

International application no.:

PCT/JP96/01622

International publication no.:

WO97/00493

The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra

Telephone No.: (41-22) 338.83.38

PATENT COOPERATION TREATY

PCT

COMMUNICATION OF
INTERNATIONAL APPLICATIONS

(PCT Article 20)

From the INTERNATIONAL BUREAU

To:

United States Patent and Trademark
Office
(Box PCT)
Crystal Plaza 2
Washington, DC 20231
ETATS-UNIS D'AMERIQUE

in its capacity as designated Office

Date of mailing:

24 April 1997 (24.04.97)

The International Bureau transmits herewith copies of the international applications having the following international application numbers and international publication numbers:

International application no.:

PCT/JP96/01622

International publication no.:

WO97/00493

**CORRECTED VERSION
VERSION CORRIGEE**The International Bureau of WIPO
34, chemin des Colombettes
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer:

J. Zahra
Telephone No.: (41-22) 730.91.11

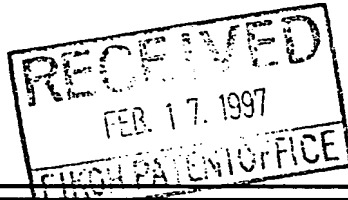
PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

HAGINO, Taira
Eikoh Patent Office
28th Floor, ARK Mori Building
12-32, Akasaka 1-Chome, Minato-Ku
TOKYO 107
JAPON



NOTIFICATION OF RECEIPT OF DEMAND

(PCT Rule 61.1(b), first sentence
and Administrative Instructions, Section 601)

Date of mailing
(day/month/year)

13.02.97

Applicant's or agent's file reference

P-24413

IMPORTANT NOTIFICATION

International application No.

PCT/JP 96/01622

International filing date (day/month/year)

13/06/1996

Priority date (day/month/year)

16/06/1995

Applicant

ROHM CO., LTD. et al.

1. The applicant is hereby notified that this International Preliminary Examining Authority considers the following date as the date of receipt of the demand for international preliminary examination of the international application:

08/01/1997

2. This date of receipt is:

- ☒ the actual date of receipt of the demand.
☐ the date on which the proper corrections to the demand were timely received.

3. ☐ This date is AFTER the expiration of 19 months from the priority date.

Attention: The election(s) made in the demand does (do) not have the effect of postponing the commencement of the national phase until 30 months from the priority date (or later in some Offices)(Article 39(1)). Therefore, the acts for entry into the national phase must be performed within 20 months from the priority date (or later in some Offices) (Article 22).

For details, see Annex B to Form PCT/IB/301 sent by the International Bureau and Volume II of the PCT Applicant's Guide.

- ☐ This notification confirms the information given in person or by telephone on:

4. Only where paragraph 3 applies, a copy of this notification has been sent to the International Bureau.

Name and mailing address of the IPEA

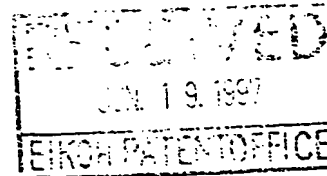


European Patent Office, P.B. 5818 Patendaan 2
NL-2280 HV Rijswijk - Netherlands
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

G.L.M. Kruidenberg

Telephone No.



From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

8/16

WRITTEN OPINION

(PCT Rule 66)

To:

HAGINO, Taira
Eikoh Patent Office
28th Floor, ARK Mori Building
12-32, Akasaka 1-Chome, Minato-Ku
TOKYO 107
JAPON

Date of mailing
(day/month/year)

16. 06. 97

Applicant's or agent's file reference
P-24413

REPLY DUE

within 2 months/days
from the above date of mailing

International application No.

PCT/ JP 96/ 01622

International filing date (day/month/year)

13/06/1996

Priority date (day/month/year)

16/06/1995

International Patent Classification (IPC) or both national classification and IPC

G06K19/07

Applicant

ROHM CO., LTD. et al.

1. This written opinion is the first (first, etc.) drawn up by this International Preliminary Examining Authority.

2. This report contains indications and corresponding pages relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 16/10/1997.

Name and mailing address of the IPEA



European Patent Office, P.B. 5818 Patentaan 2
NL-2280 HV Rijswijk - Netherlands
Tel.: (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

L. Gysen

Examiner

Formalities officer
(incl. extension of time limits)
Telephone No.

H. Daniels

I. Basis of the opinion

1. This opinion has been drawn up on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*:

☐ the international application as originally filed

☒ the description, pages 1-19 ,as originally filed
pages ,filed with the demand
pages , filed with the letter of

☒ the claims Nos. ,as originally filed
Nos. 2-7 ,as amended under Article 19
Nos. , filed with the demand
Nos. , filed with the letter of

☒ the drawings, sheets / fig. 1/6 - 6/6 ,as originally filed
sheets / fig. , filed with the demand
sheets / fig. , filed with the letter of

2. The amendments have resulted in the cancellation of:

☐ the description, pages:

☒ the claims, Nos. 1

☐ the drawings, sheets / fig.

3. ☐ This opinion has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims
	Claims
Inventive Step	Claims 2-7
	Claims
Industrial Applicability	Claims
	Claims

2. Citations and Explanations

1) The following documents are mentioned in this written opinion; the numbering will be adhered to in the rest of the procedure:

D1 = EP 0 309 201 A
D2 = EP 0 634 837 A
D3 = US 5 331 295 A *
D4 = DE 43 37 499 A

"" was not cited in the international search report. A copy of the document is annexed to the written opinion.

2) As far as it can be understood (see section VIII), the present application does not satisfy the criterion set forth in Article 33(3) PCT because the subject-matter of Claims 2-7 does not involve an inventive step (Rule 65(1)(2) PCT).

2.1) Claim 2: Document D1 discloses (cf. column 3, line 33 - column 5, line 11; figures 1, 4, 5) an IC card device (2) comprising:
a first antenna (13) for obtaining electrical power by receiving an external electromagnetic wave and rectifying (8); and
a second antenna (15) for transmitting and receiving data based on the based on the electric power, the second antenna being provided independent of said first antenna.

The subject-matter of Claim 2 differs from D1 in that the IC card comprises a ring oscillation circuit including a plurality of signal inverters, whereby an odd number of them are tandem

connected in the form of a ring; and
a constant-current circuit being set to a current value smaller than the electric current ability for transistors involved in said signal inverter, said constant-current circuit being connected in series between at least one of said transistors and a power voltage source or a reference voltage.

The problem to be solved may be regarded as to use an oscillation circuit with a relatively precise oscillation frequency over a wide range of power source voltage. The person skilled in the art of IC cards having a oscillator problem would consult the person skilled in the art of oscillators. Furthermore, the problem is known in the art of IC cards, see e.g. document D2 (cf. column 1, lines 5-35), where the problem is already solved by using a ring oscillator.

The solution proposed in Claim 2 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The ring oscillator described in document D3 (cf. column 1, lines 11-13; column 1, line 52 - column 2, line 16; column 5, lines; figures 1 and 2) provides the same advantages as in your application. The skilled person would therefore regard it as a normal design option to include it in the IC card described in document D1 in order to solve the problem posed. A simplification of the oscillator of D3 by only using a constant current source is obvious for the person skilled in the art (see D3, column 2, line 40 - column 3, line 26)

A similar ring oscillation circuit with current-starved inverters controlled by a current-mirror is also known from D4.

2.2) Claim 4: Document D1 discloses (cf. point 1.2) a communication system comprising: an IC card (2) incorporating therewithin a semiconductor integrated circuit and at least one antenna (13) so as to obtain electric power by receiving an external electromagnetic wave and rectifying, the IC card transmitting and receiving data based on the electric power; and a card gate apparatus (1) having a first antenna (12) for transmitting the electromagnetic wave for electric power and a second antenna (14) for transmitting and receiving data, the second antenna being provided independent of said first antenna.

The subject-matter of Claim 4 differs from D1 in the same way as mentioned in point 2.1)

3) Dependent Claims 3 and 5-7 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, involve an inventive step for the following reasons:

3.1) Claim 3: it is known from D3 (see also point 2.1) to generate the current the current (12) based on a constant voltage from a constant-voltage circuit (24).

3.2) Claim 5: it is known from D1 (cf. figures 4 and 5) to replace the second antenna by a separate antenna for transmission (14) and for reception (42) of said data.

3.3) Claim 6: the second antenna is used for transmission and reception of the data.

3.4) Claim 7: it is clear that the IC card should receive power in order to function.

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

- 1) It is not at present apparent which part of the application could serve as a basis for a new claim which would satisfy the criteria set forth in Article 33(1) PCT. Should the applicant nevertheless regard some particular matter as suitable an independent claim including such particular matter should be filed taking account of Rule 6.3(b) PCT. The applicant should also indicate in the letter of reply the difference vis-à-vis the state of the art and the significance thereof.
- 2) To meet the requirements of Rule 5.1(a)(ii) PCT, the documents D1 and D3 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.
- 3) It is appropriate to draft the independent claims in the two-part form as required by Rule 6.3(b) PCT, whereby the features known from D1 should be placed in the preamble. If the applicant is of the opinion that a two-part form of claim would be inappropriate he is invited to provide reasons in his reply. In addition, the applicant should ensure that it is clear from the description which features of the subject-matter of the independent claims are known from document D1; see PCT Guidelines PCT/GL/3 III, 2.3a.
- 4) Reference signs in parentheses should be inserted in the claims to increase their intelligibility, Rule 6.2(b) PCT. This applies to both the preamble and characterising portion.

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The application does not meet the requirements of Article 6 PCT because Claims 1, 3 and 6 are not clear. Furthermore, claims 1 and 3 are not supported by the description.

Claims 2 and 4:

It is not clear what is meant by: "... connected supplied with ...", probably what is explained in section V, point 1.1).

PCT



INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P-24413	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/ JP 96/ 01622	International filing date (day/month/year) 13/06/1996	Priority date (day/month/year) 16/06/1995
International Patent Classification (IPC) or national classification and IPC G06K19/07		
Applicant ROHM CO., LTD. et al.		

- This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
- This REPORT consists of a total of 7 sheets, including this cover sheet.
☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
These annexes consists of a total of 2 sheets.

- This report contains indications and corresponding pages relating to the following items:
 - ☒ Basis of the report
 - ☐ Priority
 - ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
 - ☐ Lack of unity of invention
 - ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
 - ☐ Certain documents cited
 - ☒ Certain defects in the international application
 - ☒ Certain observations on the international application

Date of submission of the demand 08/01/1997	Date of completion of this report 29.09.97
Nar Name and mailing address of the IPEA  European Patent Office, P.B. 5818 Patentaan 2 NL-2280 HV Rijswijk - Netherlands Tel.: (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer L. Gysen  Telephone No.

I. Basis of the report

1. This report has been drawn up on the basis of *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.)*

☐ the international application as originally filed

☒ the description, pages 1-19, as originally filed
pages, filed with the demand
pages, filed with the letter of

☒ the claims, Nos. , as originally filed
Nos. 2-7, as amended under Article 19
Nos. , filed with the demand
Nos. , filed with the letter of

☒ the drawings, sheets / fig. 1/6 - 6/6, as originally filed
sheets / fig. , filed with the demand
sheets / fig. , filed with the letter of

2. The amendments have resulted in the cancellation of:

☐ the description, pages:
☒ the claims, Nos. 1
☐ the drawings, sheets / fig.

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2 (c)).

4. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Claims	2-7	YES
	Claims		NO
Inventive Step	Claims		YES
	Claims	2-7	NO
Industrial Applicability	Claims	2-7	YES
	Claims		NO

2. Citations and Explanations

1) Reference is made to the following documents:

D1 = EP 0 309 201 A

D2 = EP 0 634 837 A

D3 = US 5 331 295 A

D4 = DE 43 37 499 A

2) As far as it can be understood (see section VIII), the present application does not satisfy the criterion set forth in Article 33(3) PCT because the subject-matter of Claims 2-7 does not involve an inventive step (Rule 65(1)(2) PCT).

2.1) Claim 2: Document D1 discloses (cf. column 3, line 33 - column 5, line 11; figures 1, 4, 5) an IC card device (2) comprising:

a first antenna (13) for obtaining electrical power by receiving an external electromagnetic wave and rectifying (8); and

a second antenna (15) for transmitting and receiving data based on the based on the electric power, the second antenna being provided independent of said first antenna.

The subject-matter of Claim 2 differs from D1 in that the IC card comprises a ring oscillation circuit including a plurality of signal inverters, whereby an odd number of them are tandem connected in the form of a ring; and

a constant-current circuit being set to a current value smaller than the electric current ability for transistors involved in said signal inverter, said constant-current circuit being connected in series between at least one of said transistors and a power voltage source or a reference

voltage.

The problem to be solved may be regarded as to use an oscillation circuit with a relatively precise oscillation frequency over a wide range of power source voltage. The person skilled in the art of IC cards having an oscillator problem would consult the person skilled in the art of oscillators. Furthermore, the problem is known in the art of IC cards, see e.g. document D2 (cf. column 1, lines 5-35), where the problem is already solved by using a ring oscillator.

The solution proposed in Claim 2 of the present application cannot be considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The ring oscillator described in document D3 (cf. column 1, lines 11-13; column 1, line 52 - column 2, line 16; column 5, lines; figures 1 and 2) provides the same advantages as in your application. The skilled person would therefore regard it as a normal design option to include it in the IC card described in document D1 in order to solve the problem posed. A simplification of the oscillator of D3 by only using a constant current source is obvious for the person skilled in the art (see D3, column 2, line 40 - column 3, line 26)

A similar ring oscillation circuit with current-starved inverters controlled by a current-mirror is also known from D4.

2.2) Claim 4: Document D1 discloses (cf. point 1.2) a communication system comprising: an IC card (2) incorporating therewithin a semiconductor integrated circuit and at least one antenna (13) so as to obtain electric power by receiving an external electromagnetic wave and rectifying, the IC card transmitting and receiving data based on the electric power; and a card gate apparatus (1) having a first antenna (12) for transmitting the electromagnetic wave for electric power and a second antenna (14) for transmitting and receiving data, the second antenna being provided independent of said first antenna.

The subject-matter of Claim 4 differs from D1 in the same way as mentioned in point 2.1)

3) Dependent Claims 3 and 5-7 do not appear to contain any additional features which, in combination with the features of any claim to which they refer, involve an inventive step for the following reasons:

3.1) Claim 3: it is known from D3 (see also point 2.1) to generate the current (12) based on a constant voltage from a constant-voltage circuit (24).

3.2) Claim 5: it is known from D1 (cf. figures 4 and 5) to replace the second antenna by a separate antenna for transmission (14) and for reception (42) of said data.

3.3) Claim 6: the second antenna is used for transmission and reception of the data.

3.4) Claim 7: it is clear that the IC card should receive power in order to function.

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

- 1) Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents D1 and D3 is not mentioned in the description, nor are these documents identified therein.
- 2) Independent claims 2 and 4 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in a preamble (Rule 6.3(b)(I) PCT) and with the remaining features being included in a characterising part (Rule 6.3(b)(ii) PCT).
- 3) The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/JP96/01622

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The term "...connected supplied with..." used in claims 2 and 4 is unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claims unclear (Article 6 PCT).

CLAIMS

1 (Cancel).

2 (Amended). An IC card device comprising:

a first antenna for obtaining electrical power by receiving an external electromagnetic wave and rectifying;

5 a second antenna for transmitting and receiving data based on the electric power, the second antenna being provided independent of said first antenna;

10 a ring oscillation circuit including a plurality of signal inverters, wherein odd numbers of which are tandem connected in the form of a ring; and

15 a constant-current circuit being set to a current value smaller than electric-current ability for transistors involved in said signal inverter, said constant-current circuit being connected in series to at least one of said transistors connected supplied with a power source voltage or a reference voltage.

3 (Amended). An IC card according to claim 2, the current value is generated based on a constant voltage from a constant-voltage circuit.

20 4 (Amended). A communication system comprising:

25 an IC card incorporating therewithin a semiconductor integrated circuit, at least one antenna so as to obtain electric power by receiving an external electromagnetic wave and rectifying, the IC card transmitting and receiving data based on the electric power, a ring oscillation circuit including a plurality of signal inverters, wherein odd numbers of which are tandem connected in the form of a ring, and a constant-current circuit being set to a current value smaller than electric-current ability for transistors involved in
30 said signal inverter, said constant-current circuit being connected in series to at least one of said transistors

connected supplied with a power source voltage or a reference voltage; and

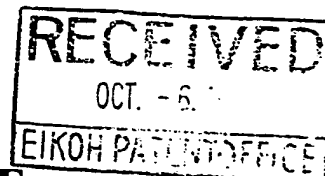
a card gate apparatus having a first antenna for transmitting the electromagnetic wave for the electromagnetic wave for electric power, and a second antenna for transmitting and receiving the data, the second antenna being provided independent of said first antenna.

5 5. A communication system according to claim 4, wherein said second antenna comprises a transmission antenna for transmitting said data and a reception antenna, which is provided independent of said transmission antenna, for
10 receiving said data.

6. A communication system according to claim 4, wherein said second antenna is switched according to the uses for transmission and reception of the data.

15 7. A communication system according to any one of claims 4 to 6, wherein said card gate apparatus transmits each electromagnetic wave such that the range of distance over which the electromagnetic wave for electric power reaches is longer than that of the electromagnetic wave for transmission of data.

PATENT COOPERATION TREATY



From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

PCT

To:

HAGINO, Taira
Eikoh Patent Office
28th Floor, ARK Mori Building
12-32, Akasaka 1-Chome, Minato-Ku
TOKYO 107
JAPON

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

Date of mailing (day/month/year) 29.09.97	
Applicant's or agent's file reference P-24413	IMPORTANT NOTIFICATION
International application No. PCT/JP 96/01622	International filing date (day/month/year) 13/06/1996
Priority date (day/month/year) 16/06/1995	
Applicant ROHM CO., LTD. et al.	

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices)(Article 39(1))(see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

N Name and mailing address of the IPEA European Patent Office, P.B. 5818 Patendaan 2 NL-2280 HV Rijswijk - Netherlands Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3016	Authorized officer M. Goedbloed-Dekker Tel.: (070) 340.40.46 Telephone No.
---	--



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 :

G06K 7/10

A2

(11) International Publication Number:

WO 97/00493

(43) International Publication Date:

3 January 1997 (03.01.97)

(21) International Application Number: PCT/JP96/01622

(22) International Filing Date: 13 June 1996 (13.06.96)

(30) Priority Data:

7/150605 ✓

16 June 1995 (16.06.95)

JP

8/10463 ✓

24 January 1996 (24.01.96)

JP

(71) Applicant (for all designated States except US): ROHM CO., LTD. [JP/JP]; 21, Saiin Mizosaki-cho, Ukyo-ku, Kyoto-shi, Kyoto 615 (JP).

(72) Inventor; and

(75) Inventor/Applicant (for US only): KAMEI, Shinji [JP/JP]; Rohm Co., Ltd., 21, Saiin Mizosaki-cho, Ukyo-ku, Kyoto-shi, Kyoto 615 (JP).

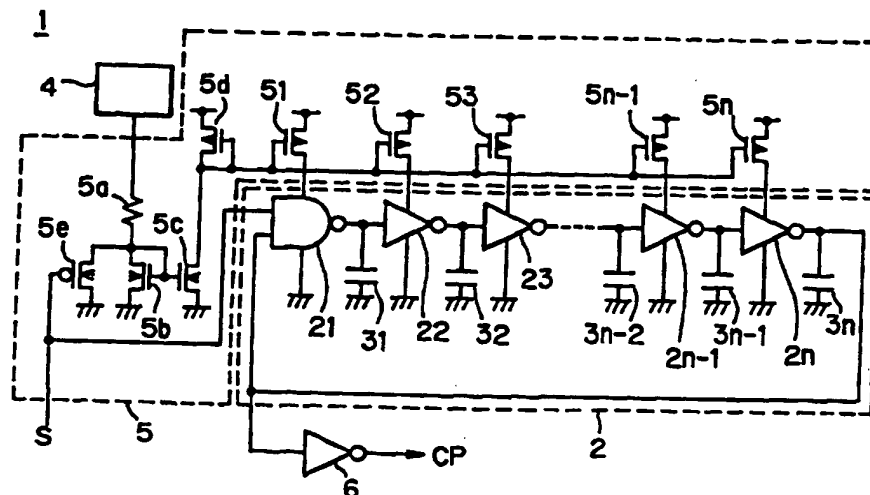
(74) Agents: HAGINO, Taira et al.; Eikoh Patent Office, 28th floor, ARK Mori Building, 12-32, Akasaka 1-chome, Minato-ku, Tokyo 107 (JP).

(81) Designated States: CA, CN, US, European patent (DE, FR, GB, IT, NL).

Published

Without international search report and to be republished upon receipt of that report.

(54) Title: SEMICONDUCTOR DEVICE, IC CARD UTILIZING THE SAME AND COMMUNICATION SYSTEM



(57) Abstract

It is an object to provide an IC card which is facilitated in circuit configuration and program-development as well as a communication system which is improved in characteristics such as the rate of communication and the distance of communication. An IC card (10) comprises an antenna (22a) for receiving an electromagnetic wave for supplying electric power, an antenna (22b) for receiving an electromagnetic wave for data, a rectifying circuit (11) with a capacitor (6) to rectify the received electromagnetic wave to get electric power, a power source circuit (12) for supplying a power source voltage to an internal circuit of the IC card (10) by the use of the electric power obtained, a detecting circuit (13) for detecting a component of data from the received electromagnetic wave, a modulating/demodulating circuit (14) for demodulating the received data and modulating data to be transmitted, an oscillation circuit (1) for generating a clock signal (CP) to be supplied into internal circuits, and a semiconductor device such as a micro-computer and memories, not shown, for processing and storing the data obtained.

DESCRIPTION

SEMICONDUCTOR DEVICE, IC CARD UTILIZING THE SAME AND COMMUNICATION SYSTEM

TECHNICAL FIELD

5 This invention relates to a semiconductor device incorporating into an oscillating circuit, an IC card utilizing the same and a communication system.

BACKGROUND ART

10 In recent years, a proximity type IC card, hereinafter abbreviatedly called as "the IC card" has being brought into usage, which is capable of confirming and updating data contained therein without manually passing through a card reader at a card gate or the like, whenever it is used. Such
15 card, called as "a radio-frequency tag" is used as a card tag in an application such as coupon tickets for skiing-ground rifts, coupon or commuter tickets for trains or buses, inventory management, and so on.

20 The IC card of this kind has a structure as shown in Fig. 4, wherein in (a) of Fig. 4 is a perspective view viewed from the above and in (b) of Fig. 4 a perspective view viewed from the side. As shown in the figure, a fixing resin 34 has a thickness of approximately 0.5 to 2.0 mm to incorporate to fix therein a substrate 31 which has semiconductor devices and
25 discrete electronic parts previously mounted thereon and an antenna 32 formed spiral in the form of a coil. The fixing resin 34 has a surface patched with a film 33, which is formed of polyethylene-terephthalate, or PET, or the like to a thickness of approximately 0.1 mm to have a given mark assigned

previously. The substrate 31 has a wiring pattern formed beforehand by printing to allow mounting thereon a semiconductor device such as a micro-computer and memories as well as discrete electronic components involving resistors, capacitors, etc. The antenna 32, serving for transmission and reception of an electromagnetic waves, constitutes a tuning circuit in association with a capacitor forming a resonant circuit.

Fig. 5 shows a general example of a communication system utilizing an IC card. The communication system of Fig. 5 comprises an IC card 10a having an independent data and a card-gate apparatus 20a, which apparatus serves to transmit an electromagnetic wave to supply electric power to the IC card 10a, as well as perform transmission and reception of data. The IC card 10a comprises an antenna 22a for receiving an electromagnetic wave, a rectifying circuit 11 with a capacitor 6 to rectify the received electromagnetic wave for creation of electric power, a power source circuit 12 for supplying an internal circuit of the IC card 10a with power source voltage created from the obtained electric power, a wave-detecting circuit 13 for detecting a data component from the received electromagnetic wave, a modulating/demodulating circuit 14 for demodulating the received data and modulating data to be transmitted, an oscillating circuit 1 for generating a clock signal CP to be supplied into internal circuits, a control circuit formed by a micro-computer and memories, not shown, respectively for processing and storing the obtained data.

On the other hand, the card-gate apparatus 20a comprises a modulating circuit 14a for modulating an electric power signal and a data signal to be transmitted to the IC card 10a, an antenna 22f for transmitting electromagnetic waves for carrying them, an antenna 22g for receiving an electromagnetic wave from the IC card 10a, a detecting circuit 13b for detecting a data component of the received electromagnetic wave from the IC card

10a, a demodulating circuit 14d for demodulating the detected data, and a control circuit 15a for processing the demodulated data to permit the card-gate apparatus, not shown, to perform control depending on the result of data processing. The control circuit 15a comprises a semiconductor device such as a micro-computer and memories, whereas the card-gate apparatus is constituted by a gate device for controlling passage, a guiding display, and so on.

Conventionally, there have been oscillator circuits, which are incorporated into the IC card 10a, such as CR oscillator circuits and ring oscillator circuits, which are easy to configure for integration for a semiconductor device without using components such as ceramic-quartz oscillators and inductance elements. These circuits were often used by incorporation within a semiconductor device. There is shown as an example in Fig. 6 a ring oscillating circuit 9 of a CMOS structure having odd numbers of signal inverters 9m, wherein $m = 1 - n$: n is a positive odd number, of such as NAND circuits and inverter circuits. These signal inverters have their input and output terminals for connection of tandem in the form of a ring. The signal inverters 9m have delaying capacitors 3m, respectively, connected to output terminals thereof. The inverter 9n is connected for supply a signal to one input terminal of a NAND 9₁ as well as to an input terminal of an inverter 6 whose output terminal is connected to supply a clock signal CP to other circuitry, not shown, where it can be used as a reference clock for a semiconductor device. The other input terminal of the NAND 9₁ is connected to be supplied with a control signal S for enabling control of commencement and halt of oscillation.

In the meanwhile, ring oscillating circuits, CR oscillating circuits, etc. as stated above were used without problem in devices such as toys, where close precision is not necessary for oscillation frequency. However, they were difficult to use

as a device for a card-gate system utilizing an IC card of the proximity type, due to reasons as discussed below.

That is, there is a demand for relatively close precision in oscillation characteristics in a card-gate system utilizing a proximity type IC card, due to the necessity of matching in timing of data transmission and reception between an IC card and a card-gate apparatus. However, an IC card has solely a power source where an electromagnetic wave transmitted from a card-gate apparatus, etc. is received and rectified therein to charge electricity on a capacitor, so that the voltage of the power source is apt to vary depending on the distance from the card-gate apparatus or a state of data reception. The variation of power source voltage causes variation in drivability of each signal inverter, so that each capacitor is changed of its charging or discharging current to vary delay time among the signal inverters, thereby resulting in variation in oscillation frequency. The drivability of each signal inverter also is readily varied by change of temperature or variation of device characteristics incurred through fabrication of a semiconductor device. Thus, oscillation frequency is further varied.

In this manner, the oscillation frequency is varied by various factors. As a consequence, the median oscillation frequency was conventionally controlled by altering the size or the number of transistors involved in a signal inverter, or otherwise vary the size of capacitors to alter the capacitance value. These alterations, however, is impractically troublesome because it necessitates a change of masking or the like used during fabrication of a semiconductor device.

As for oscillating circuits built-in semiconductor devices, there were also no techniques to suppress the variation of oscillation frequency, but for limiting such condition as power source voltage and temperature to meet the frequency-precision requirement.

Incidentally, the usage of external component parts such as discrete oscillators is expected to readily improve the frequency precision. However, it is still difficult to adopt, because an IC card as a product has a limitation in its thickness, the external-part mounting makes the substrate area large, the increased number of pins becomes necessary for packaging, the cost is raised by additional expensive cost, including control cost, for external parts.

It is therefore the object of the invention to form within a semiconductor device an oscillation circuit for presenting an oscillation frequency, which is relatively precise over a wide range of power source voltage and temperature and easy to alter, thereby facilitating the provision of a semiconductor device with less external parts used.

The communication system utilizing an IC card will then be explained briefly based on an example of a general use with reference to Fig. 5. A battery as a power source or the like is not incorporated in the IC card 10a. Consequently, an electric power necessitated by the IC card 10a is given by an electromagnetic wave having a frequency ranging from several hundreds of kilo-hertz to several mega-hertz, which wave is received by the antenna 22a of the IC card 10a upon passing by near the card-gate apparatus provided at a skiing-ground rift gate, etc. The received wave is rectified by the rectifying circuit 11, followed by charging on a capacitor or the like for obtaining necessitated electric power. Only while electric power is sufficient, a given level of power-source voltage is generated by the power source circuit 12, which is supplied to the internal circuit of the IC card 10a for reception, processing, and transmission of data.

The above stated communication system enables the content of data to be confirmed through reciprocal communication through electromagnetic waves without contacting between the IC card 10a and the card-gate apparatus 20a. This eliminates the

necessity as required in the conventional magnet-type card of such as taking the card out of a pocket and opening a vehicular window for passing the card through a card-gate apparatus whenever going through a gate, thereby shortening examination time period with relieved congestion at the gate. Owing to such conveniences, the proximity IC card and the communication system are expected to be in wider use in applications, such as confirming fees on expressways, from now on.

In the conventional IC card, however, communication is possible only while electric power can be supplied after being sufficiently stored on a capacitor through rectification of the received electromagnetic wave. Hence, there is present a problem that the rate of communication cannot be increased because of the necessity of frequent repetition of charging electricity each time the stored electric power becomes insufficient. Another problem lies in that the communication distance cannot be taken longer for a shorter charging time period, because the longer the communication distance the longer duration is necessary for charging electricity. Further, there is left other problem that the antenna of the IC card is used common for getting electric power as well as transmitting/receiving data so that the switching-over between the electric-power reception and the data transmission/reception must be performed depending on a situation. To this end, the IC card is complicate in its internal circuit together with a program thereof, thus extending a development term.

Moreover, ring oscillating circuits, CR oscillating circuits, etc. as stated above were used without problem in devices such as toys, where close precision is not necessary for oscillation frequency. However, they were difficult to use as a device for a card-gate system utilizing an IC card of the proximity type, due to reasons as discussed below.

That is, there is a demand for relatively close precision in oscillation characteristics in a card-gate system utilizing a proximity type IC card, due to the necessity of matching in timing of data transmission and reception between an IC card and a card-gate apparatus. However, an IC card has solely a power source where an electromagnetic wave transmitted from a card-gate apparatus, etc. is received and rectified therein to charge electricity on a capacitor, so that the voltage of the power source is apt to vary depending on the distance from the card-gate apparatus or a state of data reception. The variation of power source voltage causes variation in drivability of each signal inverter, so that each capacitor is changed of its charging or discharging current to vary delay time among the signal inverters, thereby resulting in variation in oscillation frequency. The drivability of each signal inverter also is readily varied by change of temperature or variation of device characteristics incurred through fabrication of a semiconductor device. Thus, oscillation frequency is further varied.

In this manner, the oscillation frequency is varied by various factors. As a consequence, the median oscillation frequency was conventionally controlled by altering the size or the number of transistors involved in a signal inverter, or otherwise vary the size of capacitors to alter the capacitance value. These alterations, however, is impractically troublesome because it necessitates a change of masking or the like used during fabrication of a semiconductor device.

As for oscillating circuits built-in semiconductor devices, there were also no techniques to suppress the variation of oscillation frequency, but for limiting such condition as power source voltage and temperature to meet the frequency-precision requirement.

Incidentally, the usage of external component parts such as discrete oscillators is expected to readily improve the

frequency precision. However, it is still difficult to adopt, because an IC card as a product has a limitation in its thickness, the external-part mounting makes the substrate area large, the increased number of pins becomes necessary for packaging, the cost is raised by additional expensive cost, including control cost, for external parts.

It is therefore the object to provide an IC card which is easy to develop of a circuit configuration and a program, as well as a communication system having characteristics improved of communication rate, communication distance, etc.

It is another object to form within a semiconductor device an oscillation circuit for presenting an oscillation frequency, which is relatively precise over a wide range of power source voltage and temperature and easy to alter, thereby facilitating the provision of a semiconductor device with less external parts used.

DISCLOSURE OF THE INVENTION

In order to solve the above stated problems, there is provided in claim 1 a semiconductor device comprising: a ring oscillation circuit including a plurality of signal inverters, wherein odd numbers of which are tandem connected in the form of a ring; and a constant-current circuit being set to a current value smaller than electric-current ability for transistors involved in said signal inverter, said constant-current circuit being connected in series to at least one of said transistors connected supplied with a power source voltage or a reference voltage.

There is also provided in claim 2 an IC card device comprising: a first antenna for obtaining electrical power by receiving an external electromagnetic wave and rectifying; and a second antenna for transmitting and receiving data based on the electric power, the second antenna being provided independent of said first antenna.

There is also provided in claim 3 an IC card according to claim 2, the IC card further comprising: a ring oscillation circuit including a plurality of signal inverters, wherein odd numbers of which are tandem connected in the form of a ring; and a constant-current circuit being set to a current value smaller than electric-current ability for transistors involved in said signal inverter, said constant-current circuit being connected in series to at least one of said transistors connected supplied with a power source voltage or a reference voltage.

There is also provided in claim 4 a communication system comprising: an IC card incorporating therewithin a semiconductor integrated circuit and at least one antenna so as to obtain electric power by receiving an external electromagnetic wave and rectifying, the IC card transmitting and receiving data based on the electric power; and a card gate apparatus having a first antenna for transmitting the electromagnetic wave for electric power and a second antenna for transmitting and receiving the data, the second antenna being provided independent of said first antenna.

There is also provided in claim 5 a communication system according to claim 4, wherein said second antenna comprises a transmission antenna for transmitting said data and a reception antenna, which is provided independent of said transmission antenna, for receiving said data.

There is also provided in claim 6 a communication system according to claim 4, wherein said second antenna is switched according to the uses for transmission and reception of the data.

There is also provided in claim 7 a communication system according to any one of claims 4 to 6, wherein said card gate apparatus transmits each electromagnetic wave such that the range of distance over which the electromagnetic wave for

electric power reaches is longer than that of the electromagnetic wave for transmission of data.

5 The semiconductor device of claim 1, using the above stated circuit configuration for the oscillation circuit, can suppress the variation in delay time for the signal inverters involved in the oscillation circuit when the power-source voltage or the temperature varies. Also, in the IC card device of claim 2, the oscillator undergoing less variation in oscillation frequency is easily formed with reduced number of external parts.

10 According to a structure of the IC card of the invention, there are provided independently an antenna 2a for obtaining electric power and an antenna 2b for transmission and reception of data so that transmission and reception of data can be made by the antenna 2b while receiving electric power necessitated for operating an IC card.

BRIEF DESCRIPTION OF DRAWINGS

20 Fig. 1 is an explanatory diagram showing a structure of an IC card and a communication system utilizing the same;

Fig. 2 is a circuit diagram showing an oscillating circuit according to the invention;

Fig. 3 is a circuit diagrams showing another example of signal inverters usable in the invention;

25 Fig. 4 is an explanatory view showing a structure of a conventional proximity type IC card;

Fig. 5 is an explanatory diagram showing the conventional proximity type IC card and a communication system utilizing the same; and

30 Fig. 6 is a circuit diagram showing a conventional example of an oscillation circuit.

BEST MODE FOR CARRYING OUT THE INVENTION

A preferred embodiment of the invention will now be explained hereinbelow in detail by referring to Figs. 1 to 3.

Fig. 1 illustrates an example of a structure of an IC card and a communication system utilizing the same according to the invention. The communication system of Fig. 1 comprises an IC card 10 possessing independent data, and a card-gate apparatus 20 for transmitting an electromagnetic wave to supply electric power to an IC card, and performing transmission and reception of a given data therebetween. The IC card comprises an antenna 22a for receiving an electromagnetic wave for providing electric power, an antenna 22b for receiving an electromagnetic wave for data, a rectifying circuit 11 with a capacitor 6 to rectify the received electromagnetic wave to get electric power, a power-source circuit 12 for supplying a power-source voltage to an internal circuit of the IC card 10 by the use of electric power obtained, a detecting circuit 13 for detecting a data component contained in the received electromagnetic wave, a modulating/demodulating circuit 14 for demodulating the received data and modulating data to be transmitted, a oscillating circuit for generating a clock signal CP to be supplied into internal circuits, and a semiconductor device such as a micro-computer and FLASH or involatile memories. The power-source circuit 12 includes a reference-voltage creating circuit for creating a reference voltage from the obtained electric power, a voltage clamping circuit to compare the power-source voltage with a reference voltage so as to render the value of the source voltage constant, and a power-source-voltage detecting circuit for outputting a signal for initializing or halting the operation of the IC card 10.

The card-gate apparatus 20, on the other hand, comprises a modulating circuit 14a for modulating an electric-power signal to be transmitted to the IC card 10, an antenna 22c for transmitting an electromagnetic wave containing the same signal, a modulating circuit 14b for modulating a data signal

to be transmitted to the IC card 10, an antenna 22d for transmitting an electromagnetic wave containing the same signal, a detecting circuit 13a for detecting a component of data contained in the received electromagnetic wave from the IC card 10, a demodulating circuit 14c for demodulating the detected data, and a control circuit 15 for processing the demodulated data to perform control on the card-gate apparatus, not shown, depending on the result of the data processing. The control circuit 15 is formed by semiconductor devices such as a micro-computer, memories, etc., while the card-gate apparatus is formed by a gate device, a guiding display, etc., for control of the gate passage.

Fig. 2 illustrates an oscillating circuit 1 according to an embodiment of the invention. The oscillating circuit 1 comprises a ring oscillating circuit portion 2 having a plurality of signal inverters connected tandem in the form of a ring, a constant-current circuit portion 5 having connections to respective signal inverters to limit output currents therefrom, and a constant-voltage circuit 4 for generating a constant voltage as a reference for prescribing an electric current value to be supplied to each of the signal inverters.

The structure of the ring oscillating circuit portion 2 and the constant-current circuit portion 5 will be explained in further detail. The ring oscillating circuit portion 2 has signal inverters $2m$ in numbers of n , wherein $m = 1 - n$; $n =$ a positive odd number, which are each formed in a MOS structure by inverter circuits, NAND circuits, etc., with input and output terminals connected tandem in the form of a ring. The signal inverters $2m$ have output terminals, respectively, connected with capacitors $3m$ for delaying transmission of an output signal therefrom. Each signal inverter $2m$ has a reference-voltage side transistor directly connected to a reference voltage, similarly to the conventional signal inverter circuit, and a power-source side transistor connected

to a power source via a corresponding constant-current source 5m of a constant-current circuit 5. With such structure, each signal inverter 2m is given an output current and the resultant delay time which are to be kept almost constant independently of variation in drivability thereof.

The constant-current circuit portion 5 serves to generate a constant electric current based on the constant voltage from the constant-voltage circuit 4 by the use of a resistor 5b and an NMOS-type transistor 5b in diode-connection. The constant-current circuit portion 5 comprises a transistor 5c connected to the transistor 5b in a current-mirror form, a transistor 5d acting as a load for the transistor 5c, a plurality of PMOS-type transistors 5m, $m = 1 - n$, connected to the transistor 5d in a current-mirror relation, and a transistor 5e for controlling the operation of the constant-current circuit portion 5. The transistors 5m are insertionally connected, respectively, in series to the power-source side transistors of the signal inverters 2m.

A control line S is connected to the transistor 5e and to the one input terminal of the NAND circuit 21 for enabling commencement and halt of oscillating. The inverter circuit 2n has an output terminal thereof, which is connected by feedback to the NAND circuit 21, is also connected to an input terminal of the inverter circuit 6. The output of the inverter circuit 6 is connected to other circuits, not shown, for supplying a clock signal CP, so as to determine timing of operation of the semiconductor device.

Incidentally, although the capacitors 3m may be each constituted by solely a parasitic capacitance of an interconnection or a diffusion layer, it will be able to cope with further low oscillation frequency with improved fabrication-oscillation-frequency precision, if the capacitance value is increased by providing a separate capacitance element. The constant-voltage circuit 4 may be formed by a usual

constant-voltage circuit using a diode forward-bias voltage or a zener-diode zener voltage, the explanation on a detailed structure thereof being omitted.

5 The operation of the circuits will then be explained. When the voltage in the control line S is in a low level, the output of the NAND circuit 21 is held in a high level and no constant current is supplied to each of the signal inverters. Consequently, each signal inverter keeps the immediately-before output state, to thereby halt oscillating.

10 On the other hand, when the voltage in the control line S becomes to a high level, the output of the NAND circuit 21 is first inverted to a low level and electricity charged on the capacitor 31 is abruptly discharged. If the charge voltage of the capacitor 31 becomes lower than an input threshold voltage
15 of the inverter circuit 22, the output of the inverter circuit 22 is inverted to thereby charge the capacitor 32 with a constant current from the transistor 52. During the charging process, when the charge voltage of the capacitor 32 goes higher than an input threshold voltage of the inverter circuit
20 23, the output of the inverter circuit 23 is inverted to cause the capacitor 33 to discharge electricity. If the operation of charging and discharging as stated is repeated through the signal inverters 2m, the NAND circuit 22 will be fed back by a signal with a voltage level different from that of the previous
25 one, because the signal inverters in odd numbers are connected in a ring form. Thus, oscillation is caused to continue.

In this manner, each capacitor 3m is charged by a constant current supplied from a transistor 5m, thus, if the value of constant current of the constant-current circuit portion 5 is
30 set such that charging is sufficiently longer in time period than discharging, this is for the purpose of setting to the value of constant current smaller than electric current ability for transistors 5m, each of the signal inverters is given an almost constant delay time regardless of variation in

drivability between the signal inverters due to fluctuations in power source voltage, thereby keeping oscillation frequency almost constant.

Incidentally, the alteration of oscillation frequency is possible by changing the number of the signal inverters or the capacitance value of the capacitors, in a manner similar to the conventional. In the present embodiment, however, each of the signal inverters can be altered of its output current and the resultant delay time by simply attaching externally a resistance 5a, which resistance is for determining the value of constant current, to change the resistance value. Thus, oscillation frequency is easy to alter.

Fig. 3 shows another embodiment of CMOS-structured signal inverters usable in the invention. (a) of Fig. 3 shows an inverter circuit configuration in a connection state, wherein a transistor involved on the side of a power line in a signal inverter 2am, $m = 1 - n$, is directly connected to a power source similarly to the conventional inverter circuit, and a transistor on the side of a reference potential line is insertionally connected in series to a constant current circuit 5am, $m = 1 - n$. An oscillation circuit is to be constituted by tandem connecting a plurality of such signal inverters in a ring form, with a constant current set by a constant current circuit structured similarly to Fig. 1. (b) of Fig. 3 shows a case, wherein constant current sources 5am and 5bm, $m = 1 - n$, are insetionally connected, respectively, in series to transistors, which transistors are respectively connected to a power source line and a reference potential line, further improving the accuracy in oscillation frequency.

An example of usage of the communication system utilizing the IC card will then be explained based on reference to Fig. 1. The electric power necessitated for the IC card 10 is to be acquired by receiving a weak electromagnetic wave of several micro-watts with a frequency of approximately several hundreds

of kilo-hertz, which is transmitted from the antenna 22c of the card-gate apparatus 20, by the antenna 22a of the IC card 10, so that the received electromagnetic wave is rectified by the rectifying circuit 11 to charge a capacitor, etc. The electric power thus obtained serves to create a given level of power voltage which is supplied to the internal circuit of the IC card 10. During reception of the electric power being supplied, simultaneously, the electromagnetic wave, which contains data for requesting confirmation on the frequency-of-usage, is transmitted from the data antenna 22d of the card-gate apparatus 20. The transmitted wave is received by the antenna 22b, detected by the detecting circuit 13, demodulated of data by the modulating/demodulating circuit 14, to thereby drive the control circuit such as a micro-computer to perform rewriting on data, such as for fees and the number of times. The result of rewritten data is modulated by the modulating/demodulating circuit 14 and then transmitted from the antenna 22b to the card-gate apparatus 20. This electromagnetic wave is received by the antenna 22e of the card-gate apparatus 20, detected by the detecting circuit 13a to be demodulated by the demodulating circuit 14c, and then data-processed by the control circuit 15, thereby enabling the card-gate apparatus 20 to confirm an ID number or a using state of the IC card so as to pass or stop solely permissible persons or things, display to guide toward a given direction, or update again data of the IC card 10.

The communication system in Fig. 1 may reduce the cross-talk of data by using an electromagnetic wave with a frequency lower than 500 kHz for electric power together with an electromagnetic wave with a frequency higher than 1 MHz for data, for instance. Also, if the IC card be given in advance with electric power by strengthening the electric field for an electric-power electromagnetic wave than that of data electromagnetic wave, or otherwise directing the directivity of

the electric-power electromagnetic wave farther than that of the electromagnetic wave for data, communication by data may be effected in a brief time with higher efficiency. With such structure, data exchange may be positively made even when passing at a considerably high speed through a gate for payment on expressway fees. Further, antennas for receiving and transmitting of the card-gate apparatus 20 may be provided jointly and switched according to the uses therefor.

In the communication system in Fig. 1, the IC card using the conventional oscillation circuit took long time to write data into a memory due to long retardation in transmitting an oscillation-frequency signal, when a power source voltage thereof is low due to reception of a low-level signal at a place distant from a transmitter of the card-gate apparatus. In contrast to this, the IC card 100 using the oscillation circuit of the invention, as used in a manner stated above, can carry out data processing within an almost constant period of time through oscillation frequency stably provided, even when the power source voltage is low. The uniformity of processing time period prevents electric current from being consumed in the oscillation circuit so that saved power can be used for transmission for extending communication distance.

Incidentally, the IC card of the present invention is not limited to the structure shown by the embodiment of Fig. 1, but all the circuit functions of Fig. 1 may be integrated in a single chip or otherwise in a plurality of chips by circuit function. The memory device may be such an involatile memory that can store data therein without a power source voltage, which may be one incorporated in a micro-computer, etc. Further, the oscillation circuit of the invention can be used for a reference clock signal for a VTR or TV set.

The structure of the IC card of the invention may be similar to the structure as discussed on the prior art, but is not limited thereto. For the fixing resin 34 for instance,

thermoplastic resins such as polybutylene-terephthalate (PBT), or thermosetting resins possessing insulation such as epoxy resins and phenol resins are usable for instance, besides the plastic resin stated hereinbefore. As for films 33, a film which is withstandable at a temperature of approximately 150 degree centigrade is also applicable, in addition to the PET stated before. It is satisfactory to provide such film onto at least one of upper and lower sides of the IC card. The substrate 31 may be located outside the antenna coil 32 in a manner independent of location and size of the substrate, though it is provided inside the antenna coil 32 in Fig. 1. Further, the substrate and antenna, if accommodated by pasting in recesses provided in the resin casing, may not require fixing with a resin.

Further, the antennas 22a and 22b may be placed in their coiled portions in an independent or concentric relation along the plane, or otherwise superposed in coiled portions along the thickness. These antennas may be configured in the form of a plate or a tube, beside a coiled form. An involatile memory including one incorporated in a microcomputer is usable, if adapted to retain memorized data even when a power source is turned off, besides a FLASH memories mentioned before.

INDUSTRIAL APPLICABILITY

As described above, the semiconductor device according to claim 1 of invention can suppress the variation of delay time of signal inverters in an oscillation circuit upon fluctuation in power-supply voltage and temperature so that the delay time is kept almost constant by a delaying circuit of the signal inverters with capacitors, thereby providing an effect of suppressing the variation of oscillation frequency over a wide range of power-supply voltage and temperature. Also, there is provided another effect of facilitating the adjustment on oscillation frequency at an initial stage solely by altering a

constant-current value prescribing an output current from the signal inverters so as to properly alter oscillation frequency.

5 According to the IC card of claim 2 and the communication system of claim 4, transmission and reception of data can be made by the antenna 22b while receiving electric power necessitated for operating an IC card, thus, both electric power charge and transmission and reception of data can be performed at the same time without switching thereof, moreover, necessitated electric power is quickly charged by charging all
10 the time, thereby providing effects of improving the characteristics in communication rate and communication distance with circuit configuration and program development facilitated. Moreover, the two independent antennas can omit a resonant capacitor provided with data transmission and
15 reception antenna in the case that a frequency range of the antenna for transmission and reception of data makes higher than that of the antenna for reception for electric power. Further, the antennas can make a capacity of capacitor for storage small for the reason of charge all the time.

20 Further, the IC card according to claim 3 has an oscillator which is easy to manufacture with less external parts used, providing the effect of facilitating the supply of IC cards capable of positive data transmission and reception.

CLAIMS

1. A semiconductor device comprising:

a ring oscillation circuit including a plurality of signal inverters, wherein odd numbers of which are tandem connected in the form of a ring; and

5 a constant-current circuit being set to a current value smaller than electric-current ability for transistors involved in said signal inverter, said constant-current circuit being connected in series to at least any one of said transistors connected supplied with a power source voltage and a reference voltage.

10 2. An IC card device comprising:

a first antenna for obtaining electrical power by receiving an external electromagnetic wave and rectifying; and

15 a second antenna for transmitting and receiving data based on the electric power, the second antenna being provided independent of said first antenna.

3. An IC card according to claim 2, the IC card further comprising:

20 a ring oscillation circuit including a plurality of signal inverters, wherein odd numbers of which are tandem connected in the form of a ring; and

25 a constant-current circuit being set to a current value smaller than electric-current ability for transistors involved in said signal inverter, said constant-current circuit being connected in series to at least one of said transistors connected supplied with a power source voltage or a reference voltage.

4. A communication system comprising:

30 an IC card incorporating therewithin a semiconductor integrated circuit and at least one antenna so as to obtain electric power by receiving an external electromagnetic wave

and rectifying, the IC card transmitting and receiving data based on the electric power; and

5 a card gate apparatus having a first antenna for transmitting the electromagnetic wave for the electromagnetic wave for electric power and a second antenna for transmitting and receiving the data, the second antenna being provided independent of said first antenna.

10 5. A communication system according to claim 4, wherein said second antenna comprises a transmission antenna for transmitting said data and a reception antenna, which is provided independent of said transmission antenna, for receiving said data.

15 6. A communication system according to claim 4, wherein said second antenna is switched according to the uses for transmission and reception of the data.

20 7. A communication system according to any one of claims 4 to 6, wherein said card gate apparatus transmits each electromagnetic wave such that the range of distance over which the electromagnetic wave for electric power reaches is longer than that of the electromagnetic wave for transmission of data.

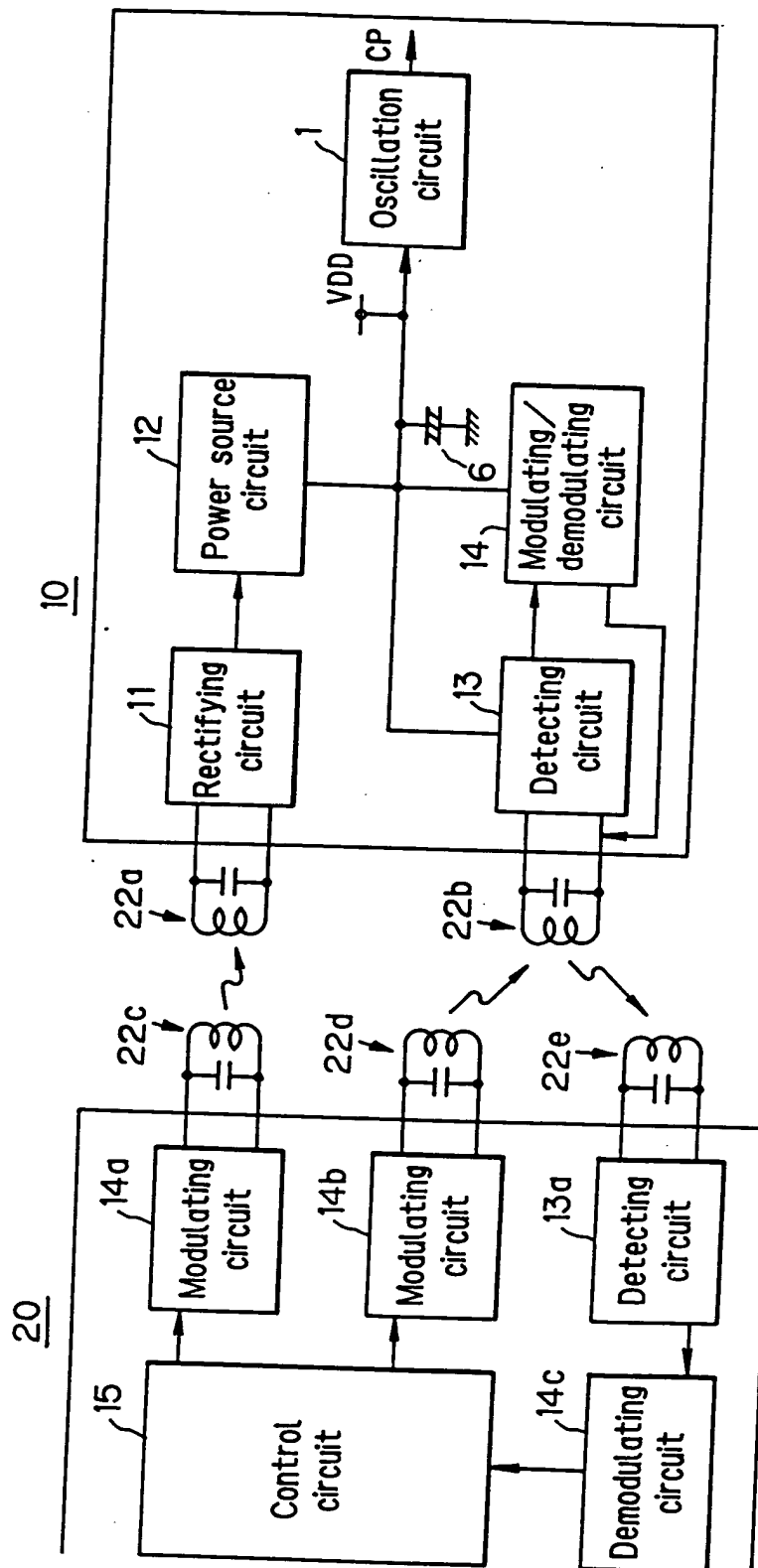


Fig. 1

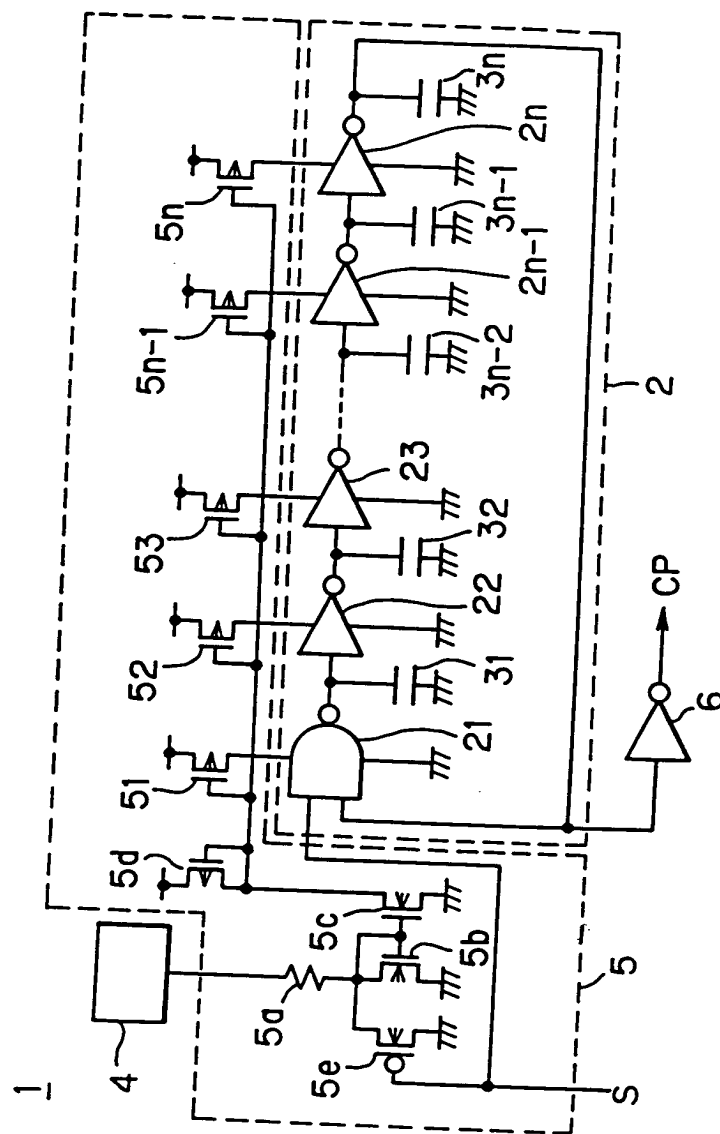


Fig. 2

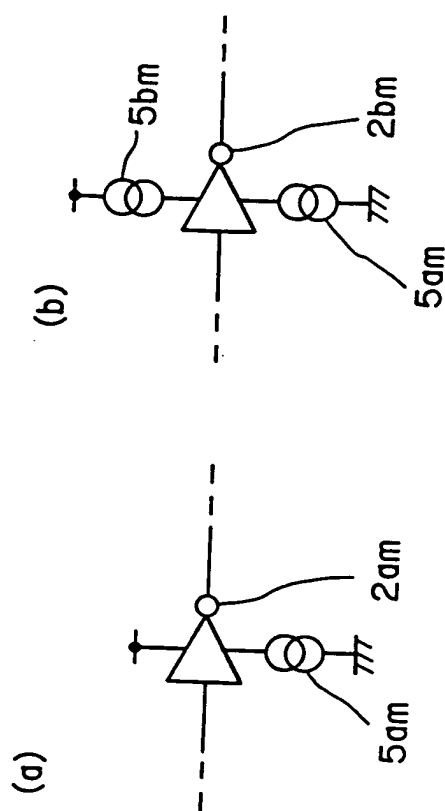


Fig. 3

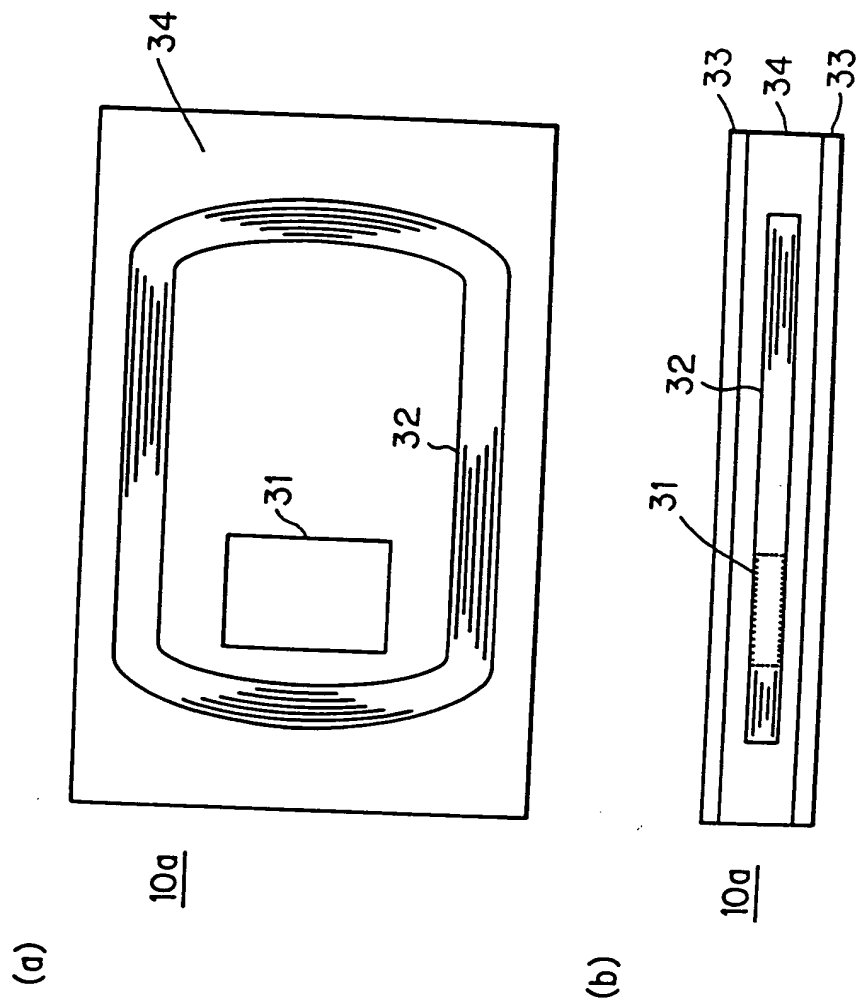


Fig. 4

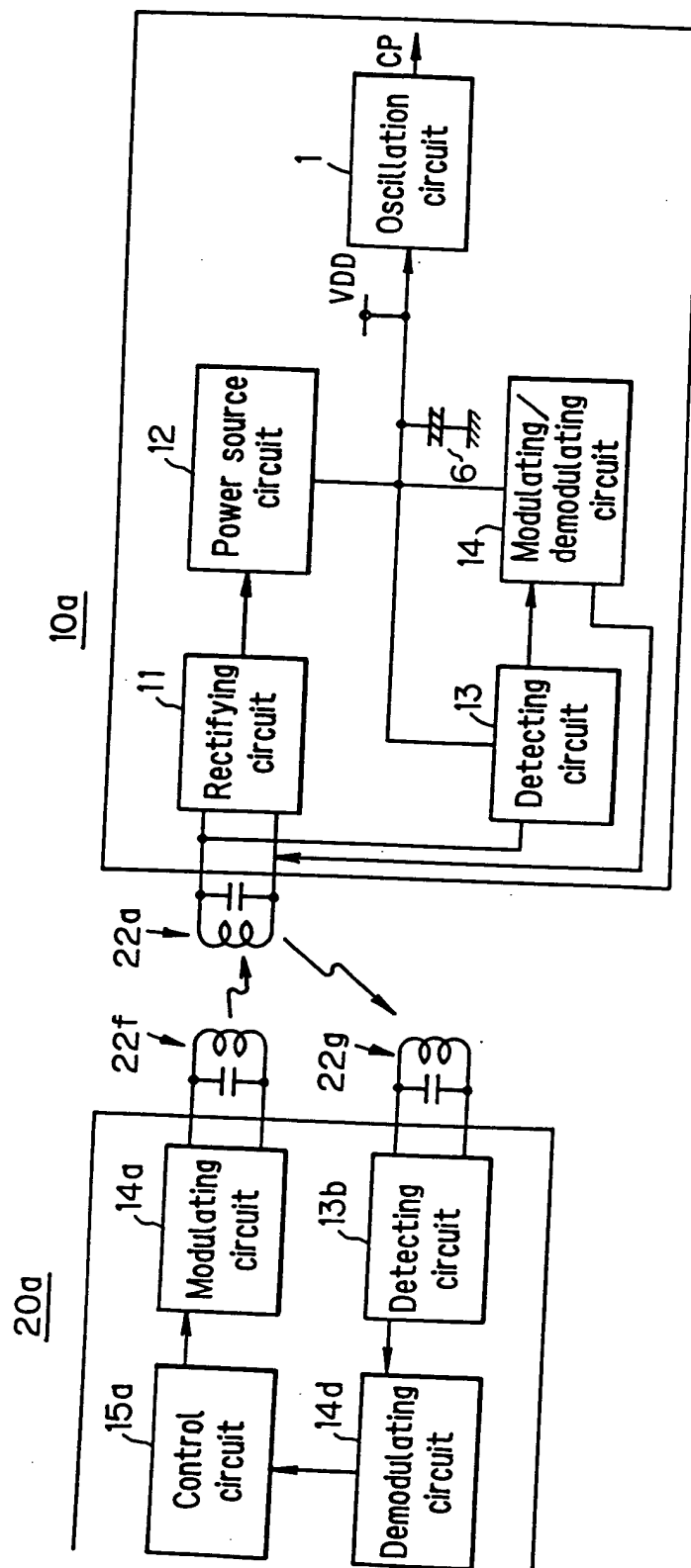


Fig. 5

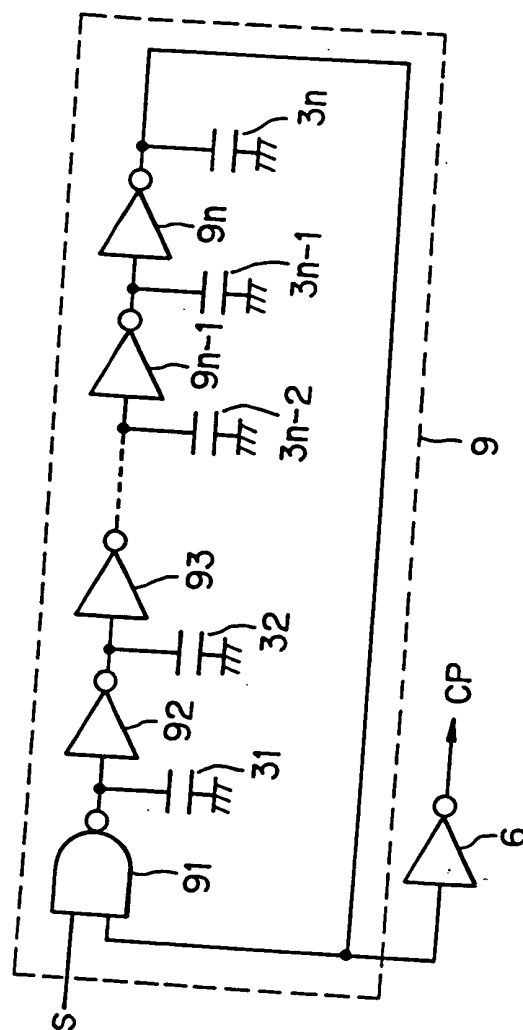


Fig. 6

WO 97/00493

PCT/JP96/01622

AMENDED CLAIMS

[received by the International Bureau on 6 May 1997 (06.05.97);
original claim 1 cancelled; original claims 2-4 amended;
remaining claims unchanged (2 pages)]

1 (Cancel)

2 (Amended). An IC card device comprising:

a first antenna for obtaining electrical power by receiving
an external electromagnetic wave and rectifying;

5 a second antenna for transmitting and receiving data based
on the electric power, the second antenna being provided
independent of said first antenna;

10 a ring oscillation circuit including a plurality of signal
inverters, wherein odd numbers of which are tandem connected
in the form of a ring; and

15 a constant-current circuit being set to a current value
smaller than electric-current ability for transistors
involved in said signal inverter, said constant-current
circuit being connected in series to at least one of said
transistors connected supplied with a power source voltage
or a reference voltage.

3 (Amended). An IC card according to claim 2, the current value
is generated based on a constant voltage from a constant-
voltage circuit.

20 4 (Amended). A communication system comprising:

25 an IC card incorporating therewithin a semiconductor
integrated circuit, at least one antenna so as to obtain
electric power by receiving an external electromagnetic wave
and rectifying, the IC card transmitting and receiving data
based on the electric power, a ring oscillation circuit
including a plurality of signal inverters, wherein odd numbers
of which are tandem connected in the form of a ring, and a
constant-current circuit being set to a current value smaller
than electric-current ability for transistors involved in
30 said signal inverter, said constant-current circuit being
connected in series to at least one of said transistors

Replaced by cut 34-

CLAIMS

1. A semiconductor device comprising:
a ring oscillation circuit including a plurality of signal
inverters, wherein odd numbers of which are tandem connected in
the form of a ring; and
5 a constant-current circuit being set to a current value
smaller than electric-current ability for transistors involved
in said signal inverter, said constant-current circuit being
connected in series to at least any one of said transistors
connected supplied with a power source voltage and a reference
10 voltage.

2. An IC card device comprising:
a first antenna for obtaining electrical power by receiving
an external electromagnetic wave and rectifying; and
15 a second antenna for transmitting and receiving data based
on the electric power, the second antenna being provided
independent of said first antenna.

3. An IC card according to claim 2, the IC card further
comprising:
20 a ring oscillation circuit including a plurality of signal
inverters, wherein odd numbers of which are tandem connected in
the form of a ring; and
a constant-current circuit being set to a current value
smaller than electric-current ability for transistors involved
25 in said signal inverter, said constant-current circuit being
connected in series to at least one of said transistors
connected supplied with a power source voltage or a reference
voltage.

4. A communication system comprising:
30 an IC card incorporating therewithin a semiconductor
integrated circuit and at least one antenna so as to obtain
electric power by receiving an external electromagnetic wave

Replaced
by Int. 1

and rectifying, the IC card transmitting and receiving data based on the electric power; and

5 a card gate apparatus having a first antenna for transmitting the electromagnetic wave for the electromagnetic wave for electric power and a second antenna for transmitting and receiving the data, the second antenna being provided independent of said first antenna.

10 5. A communication system according to claim 4, wherein said second antenna comprises a transmission antenna for transmitting said data and a reception antenna, which is provided independent of said transmission antenna, for receiving said data.

15 6. A communication system according to claim 4, wherein said second antenna is switched according to the uses for transmission and reception of the data.

20 7. A communication system according to any one of claims 4 to 6, wherein said card gate apparatus transmits each electromagnetic wave such that the range of distance over which the electromagnetic wave for electric power reaches is longer than that of the electromagnetic wave for transmission of data.



Creation date: 10-02-2003
Indexing Officer: TLO - TRUC P LO
Team: OIPEBackFileIndexing
Dossier: 08973564

Legal Date: 03-03-1998

No.	Doccode	Number of pages
1	LET.	1
2	OATH	33
3	AF/D	2

Total number of pages: 36

Remarks:

Order of re-scan issued on



A DOCPHOENIX

APPL PARTS

IMIS
Internal Misc. Paper
03/03/98 LET. 1
Misc. Incoming Letter

371P
PCT Papers in a 371 Application

A...
Amendment Including Elections

ABST
Abstract

ADS
Application Data Sheet

AF/D
Affidavit or Exhibit Received

APPENDIX
Appendix

ARTIFACT
Artifact

BIB
Bib Data Sheet

CLM
Claim

COMPUTER
Computer Program Listing

CRFL
All CRF Papers for Backfile

DIST
Terminal Disclaimer Filed

DRW
Drawings

FOR
Foreign Reference

FRPR
Foreign Priority Papers

IDS
IDS Including 1449

NPL
Non-Patent Literature

OATH
Oath or Declaration

PET.
Petition

RETMAIL
Mail Returned by USPS

SEQLIST
Sequence Listing

SPEC
Specification

SPEC NO
Specification Not in English

TRNA
Transmittal New Application

CTNF
Count Non-Final

CTRS
Count Restriction

EXIN
Examiner Interview

M903
DO/EO Acceptance

M905
DO/EO Missing Requirement

NFDR
Formal Drawing Required

NOA
Notice of Allowance

PETDEC
Petition Decision

OUTGOING

CTMS
Misc. Office Action

1449
Signed 1449

892
892

ABN
Abandonment

APDEC
Board of Appeals Decision

APEA
Examiner Answer

CTAV
Count Advisory Action

CTEQ
Count Ex parte Quayle

CTFR
Count Final Rejection

INCOMING

AP.B
Appeal Brief

C.AD
Change of Address

N/AP
Notice of Appeal

PA..
Change in Power of Attorney

REM
Applicant Remarks in Amendment

XT/
Extension of Time filed separate

File Wrapper

FWCLM
File Wrapper Claim

IIFW
File Wrapper Issue Information

SRFW
File Wrapper Search Info

Internal

SRNT
Examiner Search Notes

CLMPTO
PTO Prepared Complete Claim Set

ECBOX
Evidence Copy Box Identification

WCLM
Claim Worksheet

WFEE
Fee Worksheet

REV 7/02/03

BACKFILE DOCUMENT INDEX SHEET

6. 'd PCT/PTO '03 MAR 1998 130

31425 PCT/USA



RECEIVED
Publishing Division

MAR 3 1998

TRANSMITTAL OF
OF MISSING PART
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: SHINJI KAMEI

SERIAL NO.: 08/973,564

FILED: DECEMBER 5, 1997

RECEIVED
FOR:

MAR 17 1998

Publishing Division
Corres/Allowed Files (01)

SEMICONDUCTOR DEVICE, IC CARD UTILIZING
THE SAME AND COMMUNICATION SYSTEM

TRANSMITTAL OF MISSING
PART OF APPLICATION UNDER 37 C.F.R. 1.53(d)

Adjustment date: 10/27/1998 KDUNCAN1
03/11/1998 CASHBY 00000121 08973564
01 FC:122 Hon. Assistant Commissioner for Patents

Washington, D.C. 20231

10/27/1998 KDUNCAN1 00000018 08973564

01 FC:154 Sir: 130.00 OP

RECEIVED

MAY 26 1998

Publishing Division
Corres/Allowed Files (02)

The above-identified application was filed without a Declaration but no Notice to
Void date: 10/27/1998 KDUNCAN1 00000018 08973564
10/27/1998 KDUNCAN1 00000018 08973564
01 FC:154 -130.00 OP

Enclosed herewith is a Declaration referring to the application by one or more of the
following in compliance with 37 C.F.R. 1.63, along with Added Pages to Combined Declaration
and Power of Attorney for Signature By Person With Sufficient Proprietary Interest on Behalf of
Omitted Inventor(s) Who Refuse(s) To Sign or Cannot Be Reached (37 C.F.R. 1.47(b);
Declaration of Facts in Support of Filing On Behalf Of Omitted Inventor (37 C.F.R. 1.47);
Declaration Establishing Proprietary Interest By Person Signing on Behalf of Omitted Inventors
and Proof of Authority of Koji Takahashi to Act on Behalf of Rohm Co., Ltd.:

(X) Name of inventor and application serial number;

() Name of inventor, attorney docket number, which was on the application as filed,
and filing date of the application;

(X) Name of inventor, title of invention and filing date;